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ABSTRACT

A study examined teleconferencing applications that can assist educators in meeting Georgia's postsecondary vocational education needs. Three forms of teleconferencing were studied--audio conferencing, computer conferencing, and video conferencing. The study included a literature review, two pilot studies, and a survey to identify the ways in which other states are using teleconferencing in their vocational education programs. The pilot studies were on: (1) computer conferencing as a delivery system for 19 teachers enrolled in 2 distance education courses offered by the University of Georgia; and (2) satellite teleconferencing (video with interactive audio) for 4 staff development workshops presented to 93 teachers at Augusta Tech. Data from these sources indicated that teleconferencing can be as effective as traditional classroom approaches for instruction. The three available types of teleconferencing should not compete for total, exclusive funding for vocational educational purposes; rather, each mode should be used in specific areas where it offers distinctive advantages over the other two forms of teleconferencing (these advantages are detailed in an exhibit that is included in this report). It was also determined that the following sequence of events must occur if any successful distance teaching/learning effort is to occur: networking or needs assessment, development of a consensus of support among all parties and locations involved, careful planning in advance of the actual program, ample facilitation for those receiving the information, and evaluation of the achievement of the intended objectives. (Appendixes include an annotated bibliography, the survey instrument used to gather data on telecommunications equipment used in technology education programs in other states, satellite teleconferencing support data, and a guide to the terminology used in the report.) (MN)

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TELECOMMUNICATIONS TECHNOLOGY AND EDUCATION

A Study Identifying Appropriate Telecommunications Systems for Program Improvement in Postsecondary Vocational Education in Georgia

FINAL REPORT

June, 1987

Submitted to: Robert K. Mabry
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A number of individuals have made contributions to the success of this technology project. Insight and subsequent funding were provided by Bob Mabry of the State Postsecondary Board. Patt Stonehouse of the Postsecondary Board assisted in the planning and monitoring of the project. Jean Bowen, technical consultant, researched and drew together the individual contributions into the writing of this final report.

For the satellite teleconference, Augusta Tech provided personnel, resources, and a professional commitment by serving as a pilot site. Corinne Daniels and Karl Williams were the principal participating staff members from Augusta Tech. They assisted in identifying the topics, planning the conferencing sessions, and in providing leadership during the videoconference and workshop. The Georgia Center for Continuing Education staff, led by Jim Shehane, furnished technical assistance prior to and during the satellite broadcast. Dr. Mary Baine of the Georgia Center provided technical conferencing reports, books, and discussion time that were helpful in planning the audioconference that accompanied the satellite broadcast.

Several faculty members of the Division of Vocational Education donated their professional time and talent in planning and delivering the videoconference content. Dr. John Scott, Dr. Tracy Trussell, and Dr. Nelson Foell prepared and conducted the major content delivery sessions for the satellite broadcast. Dr. Jim Rosebrook was available for a question and answer interaction session following one of the lectures. Dr. Michelle Sarkees participated in the planning for the sessions. It was Dr. Sarkees who brought back to Georgia from her travels to Alaska the original ideas and enthusiasm for distance learning. Invaluable professional assistance was given by Dr. Hugh Gardner and Glenn Lee, a graduate assistant in the Instructional Technology Department, in editing and preparing the master videotape. Dr. Christine Langone, educational management consultant, worked with each lecturer to ensure handouts that were appropriate and in proper sequence. Sherry Shepherd, a graduate assistant in the Division, acted as telephone coordinator following the broadcast.

The computerconference pilot study was planned and conducted by Dr. Nelson Foell, who received valuable technical assistance from Charles Connor, who heads computer systems operations of the College of Education. Dr. Foell also served as the editor of a monograph on distance learning that was an outcome of this technology project.

Dr. Paul Scott, Acting Chairman of the Division of Vocational Education, provided the initiative in securing the necessary funds, logistical support, technical advice, and overall direction for this project. His patient professional assistance throughout the project is gratefully acknowledged. The project succeeded because he was committed to innovation as a means to better serve the state. His administrative leadership and support were absolutely vital.

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--Don McNelly
Project Coordinator and
Principal Investigator

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EXECUTIVE SUMMARY

Innovations in the ways information can be transmitted have improved communication effectiveness in business dramatically in the last five years. In education, telecommunications innovations are being used to stretch limited funds, give students at a distance or in smaller classes instruction they would not otherwise receive, provide professional development opportunities, and allow greater collaboration with industry on topics of interest.

A number of states have committed state funds to teleconferencing networks that are statewide or regional in nature. The networks are especially beneficial in sharing and disseminating information in medicine and education, areas of strong public concern. With the support of the Postsecondary Board of Vocational Education, this study examined teleconferencing applications that can assist educators in meeting Georgia's postsecondary vocational educational needs. Three forms of teleconferencing were studied; these were audio conferencing, computer conferencing, and video conferencing.

Findings from the literature and from two pilot studies, as well as from a survey of applications in other states, all indicate first, that teleconferencing can be as effective as traditional classroom approaches for instruction. Second, the three technological modes should not compete for total, exclusive funding for vocational educational purposes; rather, each mode offers distinct advantages for achieving specific purposes. These advantages have been compiled into a guide shown on the following page as Exhibit I.

Finally, for any successful distance teaching/learning effort, the following sequence of events must occur: 1) networking, or needs assessments, to discover unmet learning needs and the extent of available and affordable distance delivery systems, and to create administrative or broad support for the medium chosen; 2) the development of a consensus of support among all locations involved; 3) careful planning in advance of the actual event with special attention to technical details, technical support, training of presenters, advance preparation/orientation of learners, preparation of supplemental materials, and a structure that will guide the learners to achieve the intended objectives; 4) ample facilitation for those receiving the information; and 5) evaluation of the achievement of intended objectives.

(Continued)

EXHIBIT I

GUIDE FOR SELECTING A TELECONFERENCING MODE, OR COMBINATION OF MODES, TO FIT A LEARNING NEED

Decision Factor	Audio Teleconference	Computer Teleconference	Video Teleconference
1. Course Topic	Highly Verbal - languages - theory - discussion	Moderately verbal/visual - 2-dimensional images - verbal clarification - frequent feedback	Highly visual - 3-dimensional images - intense messages - non-verbal communication
2. Teacher; Lecturer	All types require topic expertise and training in use of the medium (Teleconferencing exposes weaknesses)		
3. Learner	Self-motivated	Self-paced	Attentive Concentrates well
4. Local Facilitator	Yes, for groups	Optional but not necessary	Yes
5. Advance Preparation Time	One Month	Two Months	Minimum Two Months
6. Class Meeting Time	Set	Flexible	Set
7. Class Size	Small, 1 to 20	Small, 1 to 15	Large, more than 30 Accommodates more than 100
8. Advance Orientation for Students	Materials, outline, equipment	Materials, outline equipment	Materials, outline
9. Interaction Among Students	Possible: verbal	Possible: written	Possible: verbal/visual
10. Teacher/student Involvement 1:1	High	High	Low
11. Initial Budgeted Cost	Low, $0.25 per minute/phone	Moderate, phone line use costs	High, $1,000 per hour on satellite but re-usable video tapes.

On the left, factors are listed that are considered in planning instruction. To use the guide, match each factor as closely as possible with a teleconference mode for a specific teaching purpose. After matching each factor, the best overall match with a mode, or possible combination of modes, can be seen. (Video-audio, or video-computer are frequent combinations used.)

In addition to these three major findings, useful instructional and technical tips were found by conducting two pilot studies. A) For satellite teleconferences:

--participants want live interaction with the presenter;

--satellite teleconferencing can be a successful and cost-effective delivery mode for staff development;

--intensive content delivery can maximize use of expensive satellite time, and can be effective when accompanied by appropriate handouts and discussion;

--funds should be budgeted for advance preparation time, which is essential;

--satellite conferencing costs less when conducted from a major university with existing equipment and technical support;

--for satellite conferencing, each receiving site in Georgia could purchase the necessary receiving equipment for approximately $10,000 per site. This cost could be recovered in one year when compared to direct travel expenses and time to deliver onsite training.

--satellite teleconferencing can address the needs of large groups of 100 or more simultaneously;

--presentations can be recorded on 1/2" videotape relatively inexpensively, then transferred to 1" tape for transmission; the result is the product preserved in both forms, suitable for VCR or video conference re-use.

B. For computer teleconferencing, when used to reduce but not to eliminate classroom time:

--lack of computer experience and even animosity toward computers are not deterrents in themselves to developing enthusiasm for computers and learning via computer conferencing;

--learners who commute in the evenings and on weekends like the reduced travel and flexible times for receiving instruction of computer conferencing;

--computer conference learners can interact frequently with the professor and each other for clarification and discussion;

--reference materials can be placed on file within the computer storage area for easy access for and availability to all students;

--adequate handouts must be prepared and are essential to replace lecture time;

--computer conferencing produces a ripple effect: five of the nineteen vocational education teachers who enrolled in this class have purchased their own computers, and are integrating them into classroom use for recordkeeping, instruction, and other purposes.

This study indicates that the incorporation of the use of teleconferencing into postsecondary vocational education in any of its forms will improve communication and access to instruction across the state. It has been said that, "To compete in a technological world we need to develop a computer-literate, technology-competent workforce (5)." Teleconferencing within the postsecondary vocational education system of Georgia will move our state toward that goal.

Recommendations And Proposed Action Plan

Georgia has fallen behind other large states who are benefiting by using telecommunications innovations to deliver education across distances. We recommend that the Postsecondary Board of Vocational Education consider action in the areas listed below.

1. Development of Awareness of Available Innovative Options

Teleconferencing is not perfected, but it can meet the needs of a generation of students who cannot wait for perfection to occur. We would encourage the Postsecondary Board to take these steps to develop awareness of the options available:

a. Acquaint vocational technical administrators and educators with the various types and capabilities of teleconferencing; meetings around the state could be used for brief demonstrations of audio, video, and computer applications.

b. Fund a computer message board similar to the UGA Exchange Board, linking the State Postsecondary Board and each of the other postsecondary vocational technical entities with rapid communication capability. This action will build experience across the state with this electronic mode which will lead to acceptance of and enthusiasm for the medium. At the same time, the Postsecondary Board and its members will benefit from rapid and frequent networking, the team building that will occur, common goal identification, and goal attainment leading from improved communication. Basic equipment costs need not exceed $1200/station and can be much less, as little as $150, where computer terminals already exist.

2. Identification of Unmet Needs

While building awareness, we suggest that the Postsecondary Board consider the economic benefits to Georgia of identifying long and short term employment areas that can be addressed more effectively through the use of distance education. We suggest that the Postsecondary Board:

a. Survey every location to identify courses that are offered but have low enrollments, and courses for which there is an economic demand but for which teachers are not available.

b. Identify strong industrial and academic resources at each location that could be called upon to supply expertise where it is needed.

3. Consensus Building

To build a consensus of support for creating a stronger program across the state, we would recommend that the Postsecondary Board:

a. Involve faculty and designated staff across the state in the design of the survey (from item 2 above) and in gathering the information.

b. Develop a consensus of needs, and identify positive and negative economic influences that are operated within the state postsecondary educational program.

4. Goal Setting

The goal of delivering education within the postsecondary vocational education system should be to create "learning windows" in areas of need, through which telecommunications electronic media can "beam" interactive instruction to make a specific program and the total educational program stronger.

This goal can be attained by linking the strong programs at any site with low student enrollment courses, and by considering teleconferencing where it is cost-effective and is as satisfactory as more traditional approaches to instruction.

5. Monitoring the Evolving Field of Teleconferencing

We would ask that the Postsecondary Board continue to closely monitor the rapid developments in the field of teleconferencing. We do not suggest that teleconferencing is unstable; a computer message board installed today, for example, will still be useful five years from now.

The techniques of teleconferencing continually improve, however, and we suggest that new developments can be monitored through the maintenance of state and national networks. A number of key people who can act as useful resources have been identified in this study and are listed in the report.

6. Further Pilot Programs

We recommend that the Postsecondary Board consider the funding of pilot studies that will closely examine the following:

a. the effectiveness of the different teleconferencing systems for achieving learning objectives, compared with traditional classroom instruction;

b. cost-efficiencies of the different delivery systems;

c. the evaluation of delivery systems matched to various levels of learners and specific content.

In conclusion, we do not advocate the replacement of the classroom instructor. We do advocate initiation and further exploration into the new technologies where those innovations can enhance the content of courses and serve the student population and the Postsecondary Board more efficiently.

INTRODUCTION

Innovations in the ways information can be transmitted have changed communication effectiveness dramatically in the last five years. A memo dictated in one location is printed instantly in other locations halfway around the globe. Purchase orders are placed and filled with no exchange of paper. A new circuit design is drawn on a bulletin board in Cleveland and can be seen immediately and modified in San Francisco. This new effectiveness in communication reflects very rapid recent advances in the field of telecommunications technology.

Within this decade, telecommunications innovations will make remarkable differences in the delivery of information in education. This will be especially true in the means by which information will be quickly transmitted among geographically separated learning centers like those scattered across Georgia.

Project Goal

The goal of this project was to study administrative and instructional telecommunications innovations and to identify appropriate delivery systems for program improvement in the postsecondary vocational technical school system in Georgia. The basic premise was that the use of an appropriate mix of current technological systems could improve overall communication between the State Board of Postsecondary Vocational Education and the vocational learning institutions, among the institutions themselves, and between the institutions and third party groups qualified to provide specialized information.

Project Scope

The scope of the project was limited to the study of innovations in telecommunications that would be readily available, affordable, and practical, and to matching the new telecommunications technology with

Georgia's administrative and instructional communications needs. Telecommunications systems selected as potentially useful were the following:

1) the expanded use of audioconferencing or conference calls, consisting of multi-telephone hookups for sharing verbal information;

2) the use of computer teleconferencing, interactive instruction via computer terminals linked by telephone to a central computer program. Persons use keyboards to send messages and two-dimensional images instantly to other locations; and

3) Video teleconferencing, the use of one-way video and two-way audio transmission for instruction.

The systems named above could serve the needs of the postsecondary vocational technical school improvement program from several perspectives. First, all of the systems named above could be used to place new information into every learning center in Georgia quickly and simultaneously. Second, all of the systems selected for consideration use technical production capabilities already available, lowering startup expenses. And finally, in using these innovative systems for instruction, a knowledgeable expert in one location could be the resource for all locations, so that consistent and current information, even visual design information, could be delivered across the state.

OBJECTIVES AND METHODS

Specific objectives accomplished in attaining the project purposes and the general methodology used to attain those objectives are given below.

Objective 1

The first objective of the project was to collect and analyze relevant information on current effective uses of telecommunications innovations in education.

Methods:

- A search of the literature published on this subject within the last ten years was conducted, using the computer database ERIC (Educational Resources Information Center), which was accessed through the University of Georgia Libraries. A total of 223 documents related to the subject area were identified by the search. Sixteen were selected that related most closely to the project; these were purchased on microfiche. Other articles were obtained from published teleconferencing reports and recent texts that have appeared on the subject. Three pertinent and useful texts were Olgren and Parker's Teleconferencing Technology and Applications (1), The Teleconferencing Handbook: A Guide to Cost-Effective Communication by Lazer, et. al. (2), and Teleconferencing: Linking People Together Electronically, by Kelleher and Cross (3).

- A questionnaire was designed and mailed to vocational education curriculum representatives in all other states and territories to collect information on telecommunications strategies being used to deliver professional development and instruction, particularly in postsecondary education. The resulting response rate (44%) was considered excellent for any mailout questionnaire on a comparative statistical basis alone; furthermore, some of the non-responses may reflect the lack of telecommunications innovations in those states.

- A monograph containing ten articles on the subject of distance learning was developed and printed. This monograph drew

together current information of interest to postsecondary vocational educators in this changing, technologically-based field.

- Numerous personal contacts and telephone interviews were made in relation to the project, adding information on the existing technology and its effective applications from individuals and from representatives of educational institutions, industry, and government.

Objective 2

The second objective of the project was to explore telecommunications applications in use by other governmental agencies in Georgia.

Method:

Contacts were made with military and federal government officials to determine the extent and types of teleconferencing applications used by those agencies in Georgia. The intention was to explore opportunities for shared satellite use. Contacts were preliminary; however, two agencies were found that used satellite conferences in Georgia. These were the army, which transmits from and to Fort Gordon, and the USDA, whose contact person is Betty Fleming (202-447-5368).

Objective 3

The third objective of the project was to select one or more promising telecommunications delivery modes and to field test them with target groups in postsecondary vocational education settings.

Methods:

Criteria of availability, affordability, and potential effectiveness were used to select two instructional modes for testing, a) the satellite

teleconference, and b) the use of computer teleconferencing augmented by the electronic bulletin board.

- A pilot satellite teleconference was organized, conducted, and evaluated. The Augusta Vocational-Technical School was selected as the site for the videoconference and workshop, which was coordinated from beginning to finish with the Curriculum Development Department there. Ninety-three faculty and staff members of Augusta Tech participated in the study on the topic of performance evaluation. This topic was selected to assist in fulfilling standard staff development requirements. University of Georgia faculty members donated instruction time and expertise, and the technical production facility of the Kellogg Center for Continuing Education at the University of Georgia produced the master videotape at a reduced fee for the purposes of this study. Four videotaped lectures were broadcast, and after each one, a two-way audio hookup enabled class participants to ask that lecturer questions, which the lecturer answered on camera from the studio in Athens. More detailed procedures are included with the findings to which they relate.

- Computer conferencing and the electronic bulletin board were used in a pilot instruction program for postsecondary vocational education teachers during Spring Quarter, 1987. This pilot program is described in detail within the Detailed Findings section of this report.

Objective 4

The final objective of this project was to present and recommend appropriate options to the program improvement staff of the State Board for Postsecondary Vocational Education.

Recommendations which were developed as the result of conducting this project are presented in the opening section, supported by the detailed findings of the project, which follow.

DETAILED FINDINGS

A. Teleconferencing Applications Literature Review

Wherever distance makes a communication difference, whether in business, industry or government, the use of teleconferencing---the electronic exchange of information (4)----is a steadily growing phenomenon. There are new users every year, and in this young technological field it appears that once a few innovative people introduce the concept into their organization, usage expands to others in the group.

In 1983, the Center for Interactive Programs (CIP) of the University of Wisconsin Extension surveyed 149 North American teleconferencing users in business, industry and government. The users surveyed reported a net increase of 53 percent in teleconferencing hours during 1982 versus 1981 and estimated a 33 percent increase in 1983 over 1982. Nearly 85 percent of those surveyed reported that teleconferencing was successful or very successful in their organizations. Major positive effects were: more people involved in decision making, a substantial decrease in travel time, faster decisions, shorter meetings, improved relationships between sites, decreased travel costs, other funds saved, better planned meetings, and better decisions. (5)

Telecommunications applications are also becoming multifaceted over time. As the literature reflects, it is increasingly difficult to define a user in terms of a single teleconferencing system, and vendors of telecommunications equipment are offering new combinations of electronic media to meet various needs. For example, personal computers or electronic tablets display graphics during video conferences, computer conferencing is interspersed with audio discussion, and audio conferencing is visually enhanced using interactive video. (5)

The intent of this review of teleconferencing literature was not to exhaust the subject. The intent was to describe audioconferencing, computer conferencing and satellite teleconferencing, profiling their uses and characteristics in a manner that would assist the Postsecondary Vocational Education Board in matching Georgia's vocational education needs and telecommunications technology.

In education, telecommunications innovations are being used to stretch limited funds, give students at a distance or in smaller classes instruction they would not otherwise receive, provide professional development opportunities, and allow greater collaboration with industry on topics of interest (6). The challenge is to learn how to use the new media forms and how to match appropriate innovations with educational communication needs.

Review of Audio Conferencing

Audio conferencing is teleconferencing in its oldest, most widely used and basic form. Three or more people talking from separate locations constitutes a basic audio conference (4). The concept begins with a simple telephone, and from there it can develop into as sophisticated and expensive a system as the budget will allow (5).

Several commercial suppliers of audio conference equipment referenced in the literature are AT&T (5), Connex International (7), Contech (8), Radio Shack (8), Darome (9), and American Bell (4). Valencia Community College in Florida reported that they selected Contech telecommunications equipment in 1984 after visitations to other campuses with interactive audio teletraining systems and a thorough literature review (8). Their equipment was purchased because they expected increased numbers of students at scattered sites, and they did not expect

substantial increases in educational funding. For their initial pilot study, the college bought Radio Shack equipment for approximately $500, and found it to be adequate for their small group needs.

Applications. Among types of teleconferencing, the audio conference offers clear advantages where speed is of the essence (crisis management), or where cost is the overriding consideration. However, research indicates that the audio conference can be used successfully where cost or quickness are not the major deciding factors. Examples are given below:

-- A headset phone conference was used successfully by AT&T to teach scattered employees a spreadsheet software program from a central location in only four hours of instruction, as the employees sat at their own computers. Numbered handouts in four learning modules facilitated the instruction (5).

-- The Orange County, Florida, Fire Department, with 600 employees ranging over 1000 square miles, uses audio conferencing routinely for daily briefings, staff meetings, employee relations conferences and inservice training (8).

-- Valencia Community College uses audio conferencing for credit and noncredit course instruction on a wide variety of subjects. Sample topics are microeconomics, biological science, introduction to business, and music appreciation (8).

-- Audio conferencing is used extensively by management to maintain close contact with people in the field, to form cohesive groups among field personnel who rarely meet face-to-face, to make announcements, to review contracts or policy, to receive input from personnel, to generate fresh ideas, and to reduce duplication of training efforts (10).

-- Audio conferencing is widely used to deliver adult education across distances. In Pennsylvania, for instance, rural mental health staff are linked to an academic center for ongoing training. There, securing faculty has not been a problem since policy dictates that faculty donate three hours per week to regional activities, and donations in this form reduce their travel (11). Extensive adult education networks via audio conferencing exist in many states. Some well-established examples are Wisconsin (12), Iowa (13), Illinois (14), and, of course, Texas and Alaska (15).

In common with other teleconferencing forms, audio conferencing with the intent to educate requires advance planning of two months or more so

that materials can be sent out prior to the course (15), structure that clearly defines objectives and leads to their achievement (15), skillful instructors trained in the use of this form (9, 16), and materials that are well-indexed (5).

Advantages. Audio conferencing also has some characteristics that set this teleconferencing form apart: a) audioconferencing adapts to any size group; b) participant interaction is possible and encouraged so that students are immediately aware of the concerns of other students and get instant affirmation or disagreement on their own ideas, closely akin to a classroom situation; c) interruption of the lecturer is possible at the moment when clarification is needed; d) involvement with the lecturer can occur through immediate direct dialogue, and e) costs are usually small enough to be recouped through user fees. In a study reported in 1985 in Georgia, costs for conference calls were projected to be 25 cents per minute per location in-state (17).

Limitations. Complaints about audio conferencing center on sound quality problems and on the lack of visual interaction. The audio component is all-important; "the listener does not endure poor reception well" (14). Suggestions given to ensure acceptable sound quality included equipment checks (7), minimization of room or outside noise (4, 7), and soundproofing the teleconferencing room to shield out interference from nearby computers, telephones or other electronic equipment (4).

Belief in the adage "what you see is what you get" may carry over to audio conferencing, causing complaints concerning the lack of visual interaction that are rooted in perception as well as in fact. Audio conferencing proponents believe that visual interaction is a learned expectation that is not necessarily vital to effective instruction (18).

They propose that audio conferencing achieves its objectives through different structuring of courses, including visual enhancement incorporated into handouts, audiographics, videotapes, and even photographs of the lecturer to help acquaint the students with more than a distant voice. These planners do believe that active listening skills and effective voice delivery are characteristic of successful audio conference lecturers. They state that audio conferencing should not replace all traditional meetings or instruction, but that audio conferencing can be a very effective teleconferencing medium.

A chart is provided with the Executive Summary that summarizes a number of factors to consider when selecting from among three types of teleconferences: the audio conference, the computer conference, and the satellite teleconference. Often, several visual and audio components are blended to achieve a particular result, and the chart can serve as a guide for an appropriate blend. An annotated reference guide is also given at the conclusion of the report as a guide to more detailed information on this topic.

Review of Computer Teleconferencing

A conservative estimate is that by the year 1990 there will be over 30 million personal computers installed worldwide. Their use is expected to be "increasingly cost-effective in dollars and bit rate" (19). Personal computer teleconferencing applications will evolve wherever users with a subject in common are separated by time and space.

Already, as they sit in their own offices or homes, participants in computer teleconferences are conferring by means of computer terminals and normal telephone lines, using advanced software systems designed to structure their communication (20).

Computer conferencing can be organized to allow participants to interact simultaneously in what is termed the snychronous mode or at their own time convenience, in an asynchronous mode (19). In either case, members of the group can send private messages to each other using the electronic bullletin board feature, and they can send or respond to messages open to all.

Advantages. Compared to audio and video conferencing, computer conferencing offers several unique advantages for education. These are given below.

-- Scheduling a class when everyone can meet is never a problem (1). The teleconference can be at the convenience of the participant and the lecturer.

-- Due to self-documenting and filing features of computer software, all inputs and interactions during the course can be stored and accessed for review at any time. This means that completed assignments are never "lost", and what the lecturer "said" is there on file for review. Paperwork and photocopying are reduced, as even class records can be stored in the system (1).

-- Computer teleconferencing inservice courses on subjects not related to computer use give teachers the opportunity to become acquainted with this new technology that will be a major part of their future. Research indicates that teachers, especially older teachers, can be apathetic or even hostile in their attitudes toward computers. They can be placed in the unenviable position of knowing less than their students in this area (21). By experiencing learning via the computer, they will be prepared to understand the potential for the use of computers in their classrooms as instructional tools and aids. A user-friendly orientation to the computer teleconference is an essential element in their successful introduction to this electronic medium (22). One researcher states that typing skill is not a prerequisite for success (23).

-- Computer teleconferencing allows those involved to take time for reflection before phrasing a reply, a luxury not present in face-to-face classroom discussion (24). Assimilation of new information can be somewhat self-paced.

-- The computer teleconference by itself demands no acting or voice delivery skills from the lecturer; lecture focus can be on content (24).

-- An onfile library can compensate for resource deficiencies at any distanced location. Key resource people can also be recruited to be accessible on the network to students (23).

-- Excellent contributions by students can be displayed to all course members, as would be the case in a traditional classroom (23).

-- Problems or case studies can be assigned to small groups within a class to achieve interactive solutions. Persons interact and contribute from their separate locations. An industry example of group problem-solving was cited in which 175 executives organized into seven separate groups and produced a comprehensive report on productivity in four months (19). A similar problem-solving capacity is available to students enrolled in computer teleconferencing courses.

-- Messages can be exchanged at any time between student and teacher, or between students; privacy can be protected (1).

Limitations. Computer teleconferencing has some limitations; show-and-tell methodology does not always adapt to the computer screen. And discounters of the computer teleconferencing option point to the total absence of visual and verbal interaction, the equipment fear obstacle, and the necessity for written expression as drawbacks when considering the choice of this system for distance educational delivery.

Use of this medium for distance instruction is very new. In answer to detractors, one instructor who is conducting a pilot computer conferencing program states that the potential for bringing students and teachers together via personal computers without regard to time or distance warrants further study on any perceived deterrents (23).

Nelson Foell, an associate professor currently conducting a computer teleconference pilot study at the University of Georgia, noted that his distance class enrollment of 19 vocational education teachers is twice the number of students who would have been able to attend the 52 required hours of instruction face-to-face. For this class, computer interactivity is replacing approximately 26 hours of classroom meetings, but there are about 26 hours of class discussion as well. A

user-friendly software system and initial orientation to the equipment seem to have overcome computer phobias (23).

Like audio and video conferencing, the successful computer teleconference course requires advance planning to prepare and distribute class materials and to receive information on individual student backgrounds and needs. Planning ensures computer access for each course registrant. Structure is also essential to achieve course objectives at a distance. And a well-organized instructor who understands course content and is enthusiastic about the use of this electronic medium is vital.

Crucial to the success or failure of the student is effective orientation to the equipment and the requisite software.

Review of Video Conferencing

Video conferencing combines audio and video media to link people in different places by voice and with television pictures. Television images are sent from a production site (up link) to one or more remote sites (down link). Transmission is via cable, satellite, or microwave, or various combinations of these. The video teleconference can be live or recorded, with transmission one-way or two-way. If transmission is one-way, the video conference is often enhanced with two-way audio conferencing, using regular telephone lines (25, 1).

Advantages. The unique educational appeal of this type of teleconference, the video conference, is its familiarity to target audiences and its close resemblance to traditional class discussion. Almost every American watches television. The literature states that "rare is the child, young adult, or student in higher education, today, who is not partially, at least, a creature of television conditioning"

(26). Audiences accept the medium and are intrigued by the interactive possibilities, the potential for speaking directly with the speaker on the screen.

Authors caution that interest in the video technology can overshadow interest in subject matter. As one student who participated in a pilot video conference put it, "This was one of my favorite classes this quarter, and it was the interactive video that made it so. I loved experiencing it first hand, and in a way it was more valuable to me than much of the course content" (27, p. 177).

Although several educational networks in this country program both audio and video teleconference courses, no studies directly compared the effectiveness of the two types for delivering various kinds of subject matter. The video conference appears to offer distinct advantages for certain educational and administrative purposes. Those identified in the literature are given below.

-- The video screen provides pictures of people, the missing personal element in audio and computer conferencing that can assist understanding (1).

-- Video images are three-dimensional, helpful in displaying objects or technical specifications (25).

-- The video screen imparts a larger-than-life dramatic impact. The screen tends to magnify images and effects so that "the medium itself influences people" (25, p. 210). This characteristic makes the video conference an effective vehicle to relay emotions, urgency, or intensity. Suitable conferencing applications are negotiations, motivating messages to improve performance, and policy implementation.

-- The video conference allows class members to "visit" a site or watch a demonstration at close range that they can then try in their own environment (3). Vocational education students can view a machine in action and listen to industrial onsite experts, then repeat what they have seen in their class settings to develop competency-based skills (26).

-- Satellite conferences can link persons live from across the country or even internationally to focus interactively on issues of common interest. Experts on topics of interest can discuss

their topic and answer questions from wherever they are at the time the conference is scheduled.

-- Video teleconferencing provides high exposure to the speaker. For teachers, the exposure can be conducive to establishing a receptive interactive atmosphere for learning (25).

One author suggests that educators can capitalize on some of the unique properties of the television screen, as they learn to work with the potentials and peculiarities of the medium (26). More educational research is needed in this area, but businesses are using the unique characteristics of video to bring authority figures who command respect, like Lee Iaococca, into living rooms. Industry also uses interactive video for sales and demonstration purposes. The messages are intense and personal (29).

Special Considerations. If advance planning is a consideration in audio and computer conferencing, it is a must for the complex activities preceding a video conference. Major factors include setting program objectives, selecting the audience, arranging receiving sites, scheduling the originating site and setup, arranging transmitting time, budgeting, arranging for audio interaction, designing content and format, writing a script, pre-producing special effects like graphics, working with technical production specialists, producing handouts, and rehearsing, all before the actual event (1). Three months lead time has been recommended as a minimum time for planning. The Public Service Satellite Consortium has published a text named Teleguide: A Handbook for Video-Teleconferenc Planners (30) to assist novices. It notes that the element often underplanned is the two-way audio link. The audio can be neglected while major attention is focused on the video production (1).

The video conference instructor needs special skills and practice to work effectively oncamera. Dramatic acting is not required, but coaching

can reduce video distortions that easily occur in body language and voice intonation (25). Course content delivery must also be adapted from the classroom to the slower comprehension pace of video (26).

Limitations. The major disadvantages of video conferencing systems have been their costs and the limitations that have existed in availability of sending and receiving facilities.

As the technology progresses, costs will decrease. Listed costs have often included technical facility costs such as the costs of installing sending and receiving facilities and of building production studios. When physical facilities are already in place, as they are in Georgia, basic costs, without adding special effects such as graphics, can be reasonable.

Olgren and Parker, in their 1983 text, Teleconferencing Technology and Applications (1), listed the average cost of the basic technical elements for a one-hour satellite video conference, using the type of in-place facilities available in Georgia. These are reproduced below.

Basic Technical Components and Average Costs*
(in-place facilities for one-hour meeting)

Origination studio rental and camera crew per hour	$1,500
Local loop to uplink	$ 300
Uplink transmission and 1 hour of satellite time (non-prime time on domestic satellite)	$ 750
Downlinks and meeting rooms each site	$1,800
Audio callback (4 direct-dial lines)	$ 600
Optional:	
Large screen projector, 4x5' diagonal screen each/day	$ 500
Large screen GE color or Aquastar projector each/day	$2,500
Portable earth station/day	$7,500

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* p. 282.

International link N.Y. to London via Intelsat,1 hour.....	$3,600
Fully interactive audio via bridge service/site/hour.....	$ 50
Group audio conferencing equipment/unit rental.....	$ 60

These 1983 figures do not include pre-production costs or any compensation for instructors, which could make a significant difference (1), but they do provide a basis for expense estimations.

When justifying the cost of video conferencing, travel displacement is usually a prime factor. For example, a national corporation that connected four rooms in two buildings within a local geographic area found that the rooms served 19,000 people in one year. Based on travel time of 1 1/4 hours between the two cities and an average hourly salary, the company estimated that it saved $330,000 in travel displacement in one year (12, p. 211).

Some businesses have found that travel cost benefits are outweighed by the benefits of better communication and faster decisions that result in higher productivity. Boeing, for example, directly attributed being 30 days ahead of schedule on an engineering project to their video conferencing system (1, p. 212).

A number of states have committed state funds to teleconferencing networks that are statewide or regional in nature. The networks have been especially beneficial in sharing and disseminating information in medicine and education, areas of strong public concern. Among the state systems are:

> Central Educational Network (CEN) based in Chicago, a regional network that co-owns and operates a satellite uplink serving educational and public agencies (6).
>
> Learn/Alaska, a regional network that includes two-way audio, video and computer conferencing, using satellite channel and audio teleconference bridging (15).
>
> South Carolina Educational Television Network (SCETV), a hybrid system of closed circuit and broadcast TV, radio, dedicated teleconferencing networks, and satellite links, with users from

> kindergarteners to physicians (1). Medical Grand Rounds is a popular monthly application. The Health Communications Network is associated with SCETV. Each HCN member hospital or university pays a monthly line charge fee, but the state of South Carolina is a major source of funding for the system operation. Another associated network is the South Carolina Department of Health and Environmental Control, which represents the shared use of human and technical resources among state agencies and academic institutions, as it provides continuing education to allied health professionals in 15 locations (1, p. 266).

In some instances funding is private. For example:

> The Microelectronics Center of North Carolina (MCNC), a fully interactive communications system for video, audio, and data transfer that connects six participating institutions, follows a set of towers established originally by the North Carolina State Highway Patrol for its two-way radio systems. MCNC is a nonprofit corporation that integrates university research and industrial applications (28).

A small proportion of national governmental agencies have funded video conferencing capabilities. The U.S. Department of Defense and the U.S. Department of Energy use video conferencing systems (1).

Two large consortia have been formed since 1980 to share full-motion video conferencing facilities. The National University Teleconferencing Network (NUTN) is a network of more than 100 colleges and universities which share audio, satellite video, and computer conferencing systems. The Public Service Satellite Consortium has dedicated earth stations at 60 affiliated universities (6).

The video conference as an interactive educational tool is still in its pioneering stages. This is reflected in the fact that research articles tend to focus as much on the complex technology and overcoming technical difficulties as they do on educational outcomes.

B. Survey of Teleconferencing Applications in Other States

Using a questionnaire designed to probe the applications of distance learning to vocational education in other states, printed survey forms were mailed to 56 NNCCVTE State Liaison Representatives. Individual

anonymity was assured. The response rate was 45 percent. Most questions were open-ended, eliciting a broad variety of individual answers. A copy of the questionnaire and accompanying cover letter and a list of responding states are attached to this report as Appendix B.

For the purposes of the survey, distance learning included the use of the following teleconference modes: interactive video, audio conferences, laser disk, computer conferences, electronic bulletin board, and the VCR used in remote sites. Of the 26 states responding, eight indicated no current involvement in the delivery or development of distance learning programs.

The survey questions and summarized responses are given below.

Question. What are the most important factors for a successful distance learning program? (lines provided for 5 replies).

Having equipment that works properly was listed most often. The greatest number of responses (15) focused on technical or technological factors. Responses relating to equipment and technical factors were:

Equipment; Technical

Summarized Response	Number Responding
Must have necessary equipment	3
Equipment must function properly	3
Easy access, user-friendly	2
Trained, technical staff	5
Clients willing to use technology	1
No technological barriers, like mountains	1

Program content was a major concern of 15 respondents who noted the following important factors for success:

Summarized Response	Number Responding
Needs assessment	5
Matching content and curriculum objectives	4
Information of high quality, timely information	4
Matches unmet need better than any other technology	2

Structure of the presentation was noted in seven replies. Respondents recommended that the program be self-paced and competency-based (1), allow for immediate responses to ideas being developed (1), be delivered in a standard format (1), allow for questions and answers from a wide variety of

individuals (1), be error-free and a quality production (2), and be presented in brief (15-60 minute), high-quality segments (1).

Skillful, trained instructors and skillful onsite facilitators were noted in seven replies.

The need for administrative support was listed by two persons; cooperation among districts was noted by one.

Students were mentioned specifically in three responses---that students should be thoroughly screened and counseled, that there should be student followup to be sure that content was understood and questions addressed, and that there should be evaluation of student progress and assessments made of overall progress.

Several general comments on successful distance learning included the fact that no travel is required and that distance learning reaches a wide audience.

Additional important factors stated for the success of distance learning were:

- to coordinate efforts with others and form a consortium;
- communication between onsite instructors and originating site;
- cost-effective
- marketing; promotion
- quality production
- accessibility to resources
- class credit (if applicable) must be determined prior to offering
- planning
- efficient

Question. What are the most frequent reasons for an ineffective distance learning program? (lines provided for 5 replies).

Respondents approached this question primarily by listing what ineffective programs lack. Their answers are tabulated below.

Number Responding	Reason for Ineffective Program
5	Lack of equipment; poor software; equipment breakdown; difficult access
5	Lack of training of presenters or poorly trained presenters; lack of good programs

4	Lack of planning or poor planning
4	Lack of funding; operating costs; prohibitive cost of interactive video for small systems
4	Lack of communication, in general or between sites; feedback poorly executed
3	Lack of technical support; staff
2	Poor instructional materials; lack of activities to accompany program
2	Administrative support; turf protection between institutions
2	Marketing, getting the word out
1	Procedures for grading student output in class
1	Lack of proper support for extra tutoring of students at receiving end
1	Odd timing of program
1	Infringes on teachers

Question. What are the three most frequently used distance technologies?

Technology Named	Number Responding
Videoconferencing:	
-Satellite delivery	6
-Interactive video	2
-Two-way interactive television	1
-Teleconferencing audio/visual	1
-Laser video disc interactive	1
-One-way video, two-way audio	1
-Microwave	1
VCR:	
-VCR	8
-Videotapes and telephone	1
Electronic Bulletin Board	6
Computer conferencing	4
Teleconferencing	3
Telenet	1

Audioteleconferencing	2
Laser Disk	1
Educational Television	1
Cable TV	1
Telephone	1
Correspondence	1

Question. In your opinion, please list the types of institution effectively using distance education, and why they are effective? (lines provided for 5 responses)

Institution/Rationale	Number Responding
Community Colleges	5
-community colleges are networking	
-greater access to programs in local areas	
-wider base (population) serving diverse population	
-Title III developing institution funds	
State Department of Education	3
-better utilization of state specialists' time	
-for State Plan Hearings	
-Instructional Television, Elementary and Middle Level	
Universities	3
-survey courses and interesting courses at university and college levels	
-centers for continuing education	
Small Schools	4
-rural high schools. Where courses are needed to address more stringent graduation requirements; where rural schools desire to expand the breadth and depth of curriculum offerings	
-small schools under 150 students in first 4 grades	
-schools in remote areas, 60 or more miles from another	
-K-7 (VCR's to augment broadcast system)	
Schools with Community Support for the Learning System	1
K-12 Public School Education (staff development, training)	1
South Dakota Medical Information Exchange - Network is Established	1
ITV - helps to expand and utilize limited resources	1

PBS - public dollars..... 1

TI-IN (funding)..... 1

Those funded by the Annenberg Foundation dollars..... 1

Delaware Technical and Community College..... 1

Vocational Technical Schools..... 1

Public Schools and Institutions of Higher Education/ Cooperative Pilot Project..... 1

Major corporations - for ongoing staff development..... 2

Learn Alaska (until funding discontinued)..... 1

Question. What educational institutions in your state are effectively using distance learning?

Institution	State	Contact Person	Telephone
Center for Cont. Ed.	Arkansas	Dr. Donnie Dutton	501-575-6483
Div. of Voc. Service	Alabama	Wilburn Ingram	205-261-5225
		Jim Kendrick	205-261-5225
Pleasant Ridge H.S.	New Hamp.	Don Simmons	913-651-5556
Brewster H.S.	New Hamp.	Demitry Evarraho	913-694-2236
Dexter H.S.	New Hamp.	Lee Tarrant	316-876-5416
Univ. of Idaho	Idaho	Bill Saul	
B.S.U.	Idaho	Ben Hamketon	
White Pine School Dist.	Nevada	Dr. John Havertape	702-287-4811
Lincoln Cty. S.D.	Nevada	Dr. Nelden Mathews	702-728-4471
State Dept. of Education	S. Dakota	Clif Jansen	605-773-4698
U.S.D./Statewide Ed. Svc.	S. Dakota	Jane Bromert	605-677-5281
U.S.D. Medical School (Med. Info. Exchange)	S. Dakota		605-256-5228
Maui Community College	Hawaii	Alma Cooper	808-242-5413
Southwestern Or. CC	Oregon	Tony Weaver	503-888-2525
Portland CC	Oregon	Ray Pirkl	503-244-6111
ITV	Maryland	Martha Cammarata	301-337-4209
SDE/DVTE	Maryland	Cecilia Lovette	301-333-2572
Del. Tech. and Comm. College	Delaware	Lewis Atkinson	302-736-5321
Office of Pub. Instruct.	Montana	Ron Lukenbill	406-444-2080

Western Montana College	Montana	Frank Odasz	406-683-7338
Miles Community College	Montana	Syd Sonneborn	406-232-3031
College of Great Falls	Montana	Ron Haverlandt	406-761-8210
Cactus Shadows H.C.	Arizona	Alex Belous	488-
Macana High School	Arizona	Don Hawkins	
College of Great Falls	Arizona	Dr. Paul Allen	
State Dept. of Education	W. Virginia	Brenda Williams	304-348-7880
K-12 Schools (tele)	S. Carolina	Rita Richardson	803-734-8091
K-7 Elem. (VCR's)	S. Carolina	Bob Reese	803-734-8093
Colleges	S. Carolina	Susan Bridewell	803-777-7210

Question. What exemplary programs are in process in your state?

Responses:

1. Interactive Disk/Entrepreneurship (Maryland)
   Contact: Martha Cammarata (301-337-4209)

2. Dakota State College (South Dakota)
   Contact: Rick Starling (605-256-5228)

3. White Pine High School; Lund High School (Nevada)
   Contact: Dr. John Havertupe (702-289-4811)

4. University of Montana
   Contact: Ken Fielding (906-243-4101)

5. Montana State University
   Contact: Jack Hyypea (906-994-3437)

6. Helena High School
   Contact: Paul Dorrance (906-442-8090)

7. University of South Carolina
   Contact: Susan Bridewell (803-777-7210)

8. K-12 Schools (S.C.)
   Contact: Rita Richardson (803-734-8091)

Question. What types of educational programs should be used in distance learning?

Responses:

College credit courses
Limited access programs in vocational education
Higher level mathematics and science
Foreign language
General arts education
Specialized programs. Computer science

Staff development for educators
Videotapes
Language classes
English - advanced
Most types can be delivered
Instructional television
Interactive disk
Courses to expand school curriculum in all areas for students
Community-wide participation in national dialogue of educational executives
Adult learning and continuing education after school hours
Training programs for staff from small business community
K-7 elementary programs (all subject areas)
Low student enrollment courses that do not involve a lab setting

Question. What advice would you give an educational institution considering using distance learning to serve a large state?

Responses:

1. Networking is the key to a successful program.
2. Is there an existing mechanism in place that can be utilized for delivering your program?
3. Look carefully at what you are buying or getting backed into.
4. Learn from others' mistakes; use what works for the school.
5. Prepare people first.
6. Inservice staff and presenters well.
7. Get to be a near-expert before delivering a plan.
8. Start small with interested parties from as many diverse interests as possible. Involve phone companies and cooperatives, cable TV operators, computer users in state.
9. We are looking at this right now. Effective use of consultants and team planning.
10. Survey potential clients to see what they want and in what format.
11. Visit existing programs.
12. Establish liaison among College of Education, Department of Education and ETV network to ascertain needs, transmission means, scheduling.

Question. What research should be conducted pertaining to distance delivery?

Responses:

1. Effectiveness of different delivery systems.
2. Student attitudes toward distance learning.
3. Pre-test, post-test subject learning.
4. Cost-effective studies
5. Cost savings
6. Learning time/efficiency
7. Identify potential users/then identify contact people for each group.
8. Learning effectiveness.
9. Performance outcomes matched to competencies.
10. Evaluation of delivery matched to various levels of learners and specific content.

11. Decisions made by policy makers which lead to or from use of distance learning technologies. (The educational labs located around the U.S. are framing research questions now).
12. Visit existing programs.
13. (See answer 12 to previous question.)

Question. How many hours in planning and preparation should precede one hour of live video presentation?

Response	Number Responding
8	1
10	1
30	2
50	2
1 for 1	1
depends on presentation	1

Question. When should an institution buy uplink satellite time?

a) from a broker?

Responses:

1. When the number of receivers is sufficient to justify the event.
2. When you need the service.
3. When desired programming is delivered by a broker; for best alternative.
4. For a one-time conference.
5. As often as it is the most efficient use of dollars.
6. National projects.

b) from the owner of the satellite?

Responses:

1. For ongoing usage (rental)
2. As often as it is the most efficient use of dollars.
3. When desired programming is delivered.
4. When it is the best alternative.
5. In-house, in-state use.

Discussion

These survey findings concur, point by point, with the findings from the literature search, giving strength to the following sequence of events for a successful distance learning effort to occur:

1. Networking is conducted in three directions.

a) Through needs assessments, learning needs or staff development needs at outlying sites that would be appropriate for application of a distance-learning technology are identified.

b) Available university-based or other delivery systems that could be matched to those needs are identified.

c) Policy makers who impact on delivery system choices in the state are identified and consulted.

2. A consensus of support is forged across the outlying locations involved.

3. The selected event or course is planned carefully, paying attention to technical details, site facilitation, training of presenters and staff, preparation of supplemental materials, structure and interesting format for delivery, the feelings and participation of the audience, and the achievement of course objectives within a planned curriculum. Costs are considered and monitored.

4. The course is delivered with ample facilitation, both technical and in content, for those receiving the information.

5. The achievement of objectives is evaluated and documented.

Major concerns for equipment breakdowns, untrained presenters, and the other factors named indicate that there is still unfamiliarity with the new technologies that are developing, but strong interest was expressed in continuing to experiment. The goal of overcoming the limits that distance places on education is a major impetus to the use of effective distance education modes.

C. Computer Conferencing as a Delivery System for Teacher Education*

The traditional approach to off-campus classes in higher education is to send an instructor from a university to an off-campus site. In Georgia, this can require as much as six hours of driving time one way. Scattered class members may have to drive for several hours to meet the classes, held in multi-hour evening or weekend sessions. Approximately eleven, and as many as fifteen class sessions (and trips) can be scheduled to fulfill the required 52 contact hours for class credit. The instructor and students spend hours of unproductive time and energy in travel at scheduled times that may be inconvenient for them.

Computer conferencing, one of the new additions to the teleconferencing field, offers an innovative alternative to travel for delivery and receiving education at outlying sites. In computer conferencing, instructors and students can communicate rapidly with each other from the keyboards of their desktop computers. Terminals are linked to a central computer system using an access code and telephone line (3, p. 244). For instructional purposes, course content information and completed assignments can be exchanged on the system, at times that are convenient for the student and the instructor.

Distance education questions concerning computer conferencing have centered on whether the computer terminal can be an effective instructional tool, on how students react to "learning the computer" as well as course content, and on instruction benefits versus the costs of this delivery system. To address those issues, a pilot study was designed and conducted

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* Extracted from a paper in progress (Foell, Nelson A., 1987).

by Dr. Nelson Foell of the University of Georgia in the spring quarter of 1987.

Study Population

Students who enrolled in either the Curriculum Development or the Occupational Analysis off-campus classes were required to participate in the pilot study. Nineteen students, all of whom teach vocational education, enrolled: some favored the study, some were unsure about it, and some were actively resistant. Their attitudes toward using the microcomputer and their levels of previous computer experience on entering the course are shown as Table 1 and Table 2.

Table 1: Summary of Computer Experience of Students

Years of Experience With a Microcomputer	Number of Students
2+ Years	2
1+ Year	2
Less Than 1 Year	1
0 Years	14
Total	19

Table 2: Perceptions of Students Towards Using a Microcomputer for Distant Learning

Classification	Willing to Try	Unsure	Opposed To It
Experienced Computer Users	5	-	-
Inexperienced Computer Users	4	7	3
Totals	9	7	3
Percentage*	48%	37%	16%

*Percentage does not equal 100 percent due to rounding.

The nineteen class members taught vocational education courses in the secondary, postsecondary, or correctional institutions of Georgia. Educational backgrounds of the students ranged from the CED through masters degrees. One taught agricultural education, one taught nurses in a hospital, and the others taught trade and industrial classes. Students ranged in age from 25 to 62. Two were female. Nine students were taking undergraduate level coursework, and ten were taking graduate level coursework. Two of the students lived more than 170 miles from the off-campus site, three lived more than 100 miles from the site, and the others lived within 60 miles of the off-campus site, which is located in Macon, Georgia.

At the start of the course, five students owned their own computers. The remainder had access to computers at their teaching locations or were loaned microcomputers and modems by the College of Education. The modems were used to accept digital signals from the computers for transmission on telephone lines.

None of the students had used a computer for communication purposes prior to the course, and of the 19 students in the course, 14 had never used a computer at all.

Methodology

Equipment and Technical Support. The University of Georgia College of Education provided the host computer system, modems to enable the telephone linkage of student microcomputers to the host computer, and microcomputers for students who did not have them. Students could use standard telephone lines to dial in, or access, the host system, to which their modems were linked. The host computer and four phone lines, two of which were

toll-free, were operational seven days a week, 24 hours a day. Class members did not dial in simultaneously, but at their convenience, to receive or send assignments. A special conference area was created for course use within the host computer's Bulletin Board computer program by the technical systems operator, Charles Connor, who could be called upon at any time by students in need of technical assistance.

Resources. The technical systems operator served an important function by remaining available on standby to troubleshoot technical problems for students whenever those problems occurred. Other persons agreed in advance to serve as content resource contacts for students as members of the computer conferencing network, so that students could access them to ask questions related to the course. These persons included designated faculty members of the Division of Vocational Education, designated personnel of the Georgia Department of Education, and local vocational supervisors.

In addition, each student could contact any other member of the class via the computer network at any time. This capability reduced the problem of isolation that has been associated with distance learning (12). Past studies had shown that students wanted to know that the questions they raised were shared by other students in the class. The message board capability of this teleconferencing system allowed this type of interaction to occur.

Using this system, a class member could contact another class member, a resource person, or the class instructor as often as desired. Messages were essentially private, although the students were made aware that any message could be monitored by the instructor or the technical systems operator.

A reference library was provided to the students by establishing a Trade & Industrial library section on the host computer that could be accessed at any time. Texts placed on file included reference books that were needed frequently such as the Occupational Outlook Handbook. This library section was archived for future course and faculty reference use.

Course Procedure. The traditional approach for meeting the objectives and requirements of off-campus courses is shown as Exhibit II. The traditional course used an individualized, self-paced mode as the primary delivery system. The instructor's role in the eleven class meetings was to supplement, clarify and review the self-learning process for the vocational education teachers in the class.

For this pilot study, everyone met in the first class session, where the pilot study concept was introduced, and course materials and computers were distributed. In that session, everyone participated in a user-friendly exercise that enabled each class member to become familiar with the equipment and to begin to practice with it. No attempt was made to teach programming or any technical aspects of the computer.

At the outset of the course, nine students were enthusiastic about using the computer, seven were unsure, and three were deadset against even touching the keyboard. Within two hours, every student could send and receive messages. Learning to create and send or receive files required more practice.

Two classroom sessions were held initially to present course instruction and to allow the students to continue to learn to use the telecommunications system. During the first classroom session, the instructor explained that learning would be self-paced within the reasonable structural limits of the quarter system, as it had been in the past. However, for purposes of the pilot study, the course design included

EXHIBIT II

ETI 502/702
Curriculum Development in Trade and Industrial Education

Trade and Industrial Education Department

The University of Georgia

This course is designed to assist teachers in preparing curriculum materials for use in their instructional programs. Teachers will experience learning topics on developing unit plans, lesson plans, individualized learning packages and curriculum delivery systems.

The course is divided into six self-paced instructional packets concerning the following broad topics:

1. Georgia's Vocational Education curriculum structure
2. Curriculum development and design
3. Planning curriculum and collecting data
4. Establishing philosophical goals and program objectives
5. Developing lesson plans and supporting materials
6. Assembling curriculum materials and developing a program evaluation form.

The course will use the individualized, self-paced teaching mode as the primary delivery system. The instructor will supplement the course with periodic presentations and review sessions. Students will have assignments to complete at the end of packets, plus articles to read and critique topics appropriate to the course.

Course Objectives

The trade and industrial teacher must be able to:

1. Describe the progress of curriculum development.
2. Identify and describe the affect of major and minor curriculum determinants.
3. Develop a teacher's curriculum manual.
4. Describe a feedback component for your curriculum.

Course Requirements

Attendance: University of Georgia regulations for inservice classes specify that students must experience 52 hours of instructional time. Normally these classes will meet 4 hours per night for eleven weeks. However, special arrangements may be made between instructor and student to alter the time periods. For example, it may be desirable to attend class longer hours and reduce the number of meetings to save on expenses.

six traditional class meetings, about half of the standard course meetings. Handout materials were expanded to include supplementary material that had previously been presented in class.

The computer was used to send and return completed class assignments and to clarify, within 24 hours, any problems the class member was having. The students could ask for assistance at any time by writing questions at their keyboards. The questions were stored immediately in the host computer system in Athens. Every day, at a convenient hour, the instructor checked the host for messages and wrote replies. This rapid frequent clarification was the unique advantage that the computer offered over the usual slower response to problems in only 11 class meetaings.

Completed assignments were sent to the instructor via computer. The instructor checked at his terminal several times daily for incoming messages or assignments. Assignments were scanned quickly for completeness as they arrived; then, the instructor transferred the completed work to a protected storage file until it could be graded. Just as in a traditional class, examples of excellent completed work were displayed for the entire class to "see."

During this pilot course, information was gathered on the effectiveness of this method for achieving course objectives and the attitudes of class members about the new technology. The time involved for the faculty member to administer this instruction was assessed, and costs were monitored.

Results

Preliminary results for this class, which is still in progress, were mixed, but primarily positive. Students reacted favorably to their reduced

travel time; in fact, it was felt that about half of those enrolled would not have been able to meet eleven regular class sessions.

Attitude of the students toward the computer use varied. A number of the 19 class members exhibited the "ripple" effect that has been reported in the literature: these students have become computer enthusiasts, and are finding other applications beyond the immediate course, for classroom record-keeping, instructional or other purposes. Five have bought their own computers since the class began.

Three of the nineteen experienced technical difficulties. One of those three dropped the course. Interestingly, the students with problems were not those who entered the class with no background experience in computers.

The evaluation of the course is incomplete, since the term is not over, but information gathered with this small group indicates that further exploration by the Division in the area of computer conferencing is warranted.

D. Satellite Teleconferencing as a Method of Staff Development *(31)

Postsecondary vocational education faculty in Georgia are required to complete 150 hours of staff development workshops or seminars annually. The workshops are frequently staffed by members of the vocational education faculty of the University of Georgia College of Education. Since there are

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* Extracted from McNelly, D.E. (1987, March) Higher educational institutions and distance learning. Paper presented to off-campus advisory council, University of Tennessee (Knoxville).(31)

32 vocational educational centers scattered across the state, considerable faculty travel can be spent presenting duplicate information at various locations.

Satellite teleconferencing capability has recently become available at several sites in Georgia, including the Kellogg Center for Continuing Education, located on the University of Georgia campus in Athens. A video presentation can originate on the Athens campus and be seen, relayed via satellite, at one distant site or at multiple sites around the state simultaneously. By combining a one-way video presentation with two-way audio transmission, interactive discussion between the lecturer in the studio and the audience at the separate site becomes possible. Two-way video with interactive sound is also possible, but is more expensive.

Using one-way video, two-way audio conferencing, large numbers of seminar participants at various sites can have access to one dynamic presentation. Personnel at several separate physical locations can receive the same information on a topic at the same time. Using the audio conferencing feature of the system, the seminar participants can interact with persons at other locations around the state to share views on a topic with each other as they discuss it with the lecturer.

Practical educational uses of video conferencing are becoming common through research and development efforts around the country. As a pilot study in postsecondary vocational education, a satellite teleconference was designed as the initial presentation of a three-day staff development workshop on the subject of Performance Evaluation. This pilot study was conducted for two reasons: 1) to assess the current operational aspects of this educational delivery system in relation to postsecondary vocational technical education in Georgia and 2) to evaluate participant reaction as one measure of the effectiveness of this type of distance education.

Study Population

Faculty and staff members of one postsecondary institution, Augusta Tech, were selected as the target population for the study. Ninety-three persons attended. Coordination of the topic was through the Augusta Tech Curriculum Development Department.

Invitations to attend and observe were extended to staff members of the State Postsecondary Board of Vocational Education, staff members of the State Secondary Board of Vocational Education, and to Dean Alphonse Buccino of the College of Education, University of Georgia.

Of the target study group of 93 persons, sixty-four (70%) had not participated in video conferencing before.

Methodology

Equipment and Technical Support. The teleconferencing staff of the Kellogg Center for Continuing Education provided technical assistance and guidance during advance planning. They also furnished technical support in the actual production and presentation of the one-way video, two-way audio teleconference.

The videoconference was divided into separate topic segments that were pre-recorded on inexpensive 1/2" videotape by three University of Georgia vocational education faculty members. The completed 1/2" tape was then dubbed onto a one-inch master videotape for satellite presentation purposes, using technical facilities within the University of Georgia. The 1/2" videotape was also preserved in its original form and can be used in the future for VCR presentations.

For the conference, four meeting rooms with video viewing screens were arranged on the campus of Augusta Tech to simulate reception at four separate receiving sites. An audio conferencing station was placed adjacent to but outside of the conference rooms to preserve sound quality.

At the station, written questions received from class participants were read over a telephone line to the lecturer standing by in the television studio in Athens. The class member could see and hear the lecturer who responded to the questions. The procedure of writing questions for submission to the lecturer was instituted to prevent dead air time, and to allow some pre-screening of questions for their relevance to the large group.

Course design. This pilot staff development workshop was designed to maximize video use through the concentrated delivery of lectures for two hours of costly studio and satellite time. The videoconference medium enabled the audience to see and hear four faculty members who presented key concepts and to immediately ask them questions. The agenda that was followed is shown as Exhibit III. The videoconference lasted two hours, but immediately afterward, breakout discussion sessions were facilitated by onsite career development staff for the total three-day training workshop.

Extensive handout material was prepared in advance; this allowed the facilitation of taking notes while receiving continuous video broadcast lecture material.

Professional and technical resources. Faculty members of the Division of Vocational Education of the University of Georgia donated their efforts to the pilot project. Administrative support came from the Dean of the College of Education and from the Administrative Director of Augusta Tech. The Curriculum Department of Augusta Tech provided facilitation and coordination of the workshop onsite.

Technical assistance was provided at Augusta Tech by Mr. Karl Williams, a member of the Augusta Tech staff. During the presentation, facilitators in each of the four conference rooms were on hand to assist

EXHIBIT III

PROGRAM SCHEDULE/AGENDA

Topic	Time	Staff
Orientation to Staff Development	Prior to Broadcast	Augusta Tech
Introduction to Training Program	5 min.	Dr. Paul Scott Dean Buccino
Topic I: Rationale for Performance Evaluation and Definitions	15 min.	Dr. John Scott
Questions and Discussion:Topic I	5 min.	
Topic II: Basic Types of Performance Evaluation, Advantages and Disadvantages	15 min.	Dr. Nelson Foell
Questions and Discussion: Topic II	5 min.	
Break	5 min.	
Topic III: Survey of Available Measures	20 min.	Dr. Tracy Trussell
Questions and Discussion: Topic III	5 min.	
Topic IV: Developing Performance Measures	20 min.	Dr. Tracy Trussell
Questions and Discussion: Topic IV	5 min.	
Topic V: Administering Performance Tests	10 min.	Dr. John Scott
Questions and Discussion: Topic V	5 min.	
Wrap-Up		

with any technical problems of the audience and to convey questions to the audio conferencing stations outside the viewing rooms.

Evaluation Procedures. A brief evaluation instrument, developed in cooperation with the Augusta Curriculum Development Department, was administered to the 93 class participants immediately after the video conference and audio discussion. In addition to a tabulated frequency count of question responses, a cross-tabulation was performed to compare responses from persons who had previous videoconferencing experience and those who did not.

As an additional evaluating mechanism, an independent observer noted the reactions of the group during the broadcast.

Findings

Findings of this study can be divided into two categories, those related to operational procedures, including the costs of procedures, and those related to the responses of those attending the conference.

Cost Findings. Cost has been considered a major obstacle to educational videoconferencing. This pilot study was cost-effective, based upon the following analysis of actual costs versus cost-savings effected by eliminating faculty travel that would have been necessary to achieve the same learning objectives:

Actual Costs:

Consulting and Production Costs.....	$2,000.00
Cost of 1/2" videotape.....	90.00
Estimated cost above usual for special handouts needed for distance delivery, $2.00 x 93 participants.....	186.00
	$2,276.00

Cost Savings:

(based upon 3 separate onsite sessions for 30 persons, each given by 4 faculty members)

Mileage round-trip, Athens to Augusta,
4 faculty ride together, 202 miles
@ .21/mile x 3 trips.....$ 127.00

4 faculty members away from jobs at
$186.00/day, based upon average
$35,000 annual salary plus 33%
fringe benefits, 4 x $186 x 3 days....$2,232.00

$2,359.26

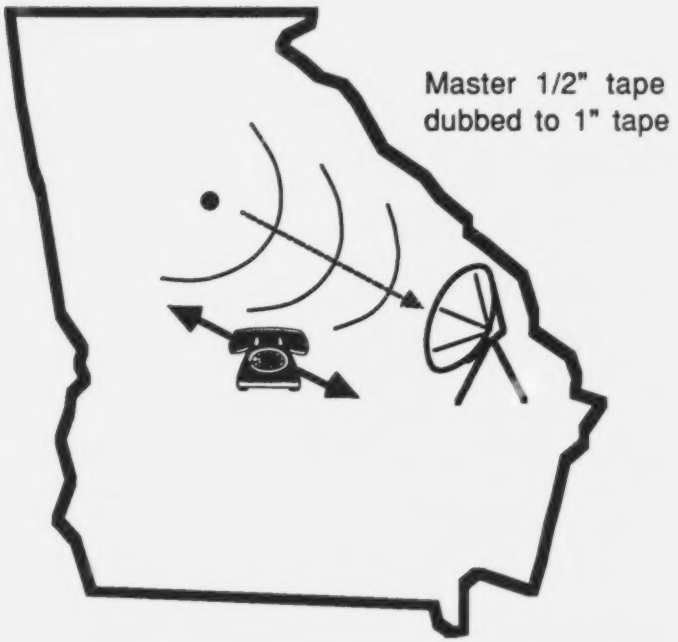
Videoconference Savings = $ 83.26

The cost of meals for faculty was omitted from the cost-savings examples, since University employees are not reimbursed for meals when an overnight stay is not necessary. Lodging was not a factor either for the trip to Augusta, a two-hour drive from Athens. If the videoconference had taken place where an overnight stay would have been necessary to deliver an onsite seminar, the cost savings of the videoconference over the onsite instruction would have been far greater.

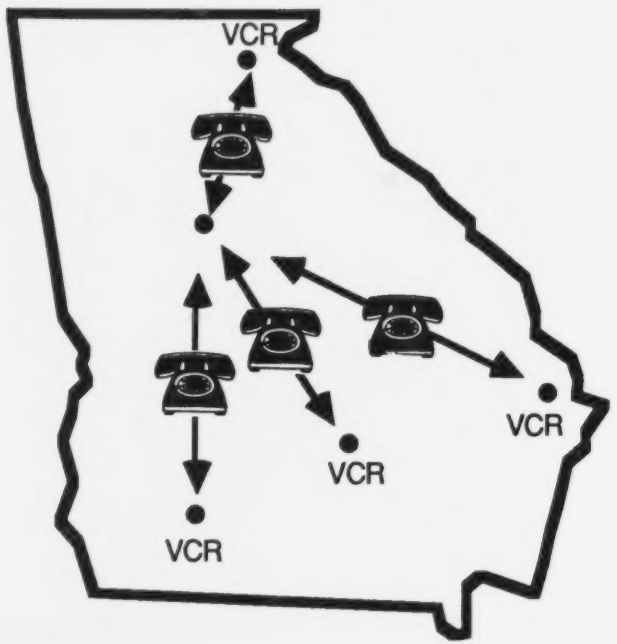
The re-usable videotape is a cost-savings bonus in favor of videoconferencing, as shown in Exhibit IV. The original $90.00 videotape, still available, could be duplicated for $14.00 per copy and sent to each of the 32 vocational education institutions in Georgia to provide their faculty the opportunity to receive the same videoconferencing instruction that was given in Augusta. The tape could be used in conjunction with audio conferencing, at approximately 25 cents/minute/telephone line, to allow interactive discussion with the four lecturers who developed the taped information.

Videoconference Exhibit IV

Future Cost-Savings of One Videotape Production



Phase 1 Original One-way Video, Two-way Audio Teleconference



Phase 2 VCR Use of Original Videotape plus Audioconference for Interactive Enhancement

Phase 1: master tape, $90.00
Phase 2: duplicate videocassette tapes, $14.00 each
Audio costs, both phases : 25¢ / minute / telephone line

In calculating the actual cost of a video teleconference, there is a hidden factor that cannot be ignored, the cost of the hours of complex preparation time. Actual preparation hours for this pilot project were not tallied, but a significant quantity of time was required to coordinate the technical and logistical aspects of the session, to prepare and practice the videopresentation, and to create more detailed handouts than those used for classroom instruction. This time cost was not budgeted into the pilot study, but would have to be forecast as a cost for developing initial subject offerings in the future. Preparation hours could be expected to decrease, however, with each recurring event involving the same faculty member. Based upon this study, the estimated time required to develop a training topic for videopresentation is approximately one quarter, or ten weeks, at a minimum.

Operational Findings. Several operational observations from this study could serve as useful guidelines for others in developing videoconferences. These are given below.

1. Pre-recording. Videotaped segments of the workshop were pre-recorded for both technical and professional reasons. Technically, pre-recording allowed editing to create a final professional product. Professionally, pre-recording allowed for practice and the filming of several takes, enabling faculty members involved to become familiar with the equipment and the process.

2. Editing. The videotape film should be allowed to run for 20 seconds at the beginning of each taped segment. This lead time, along with maintaining a log of the various scenes, facilitated the editing of the final product. In addition, the lecturer sat with the editor and reviewed the scenes, which simplified and accelerated the editing task.

3. Filming. Several techniques were used to add visual variety to the video presentation. The lecture segments were enhanced by including related classroom or laboratory scenes iilms on campus. The length of each lecture segment was limited to 15 to 20 minutes, followed by five minutes of interactive questions and answers. The variety was appreciated and commented upon by the viewers.

4. Sound quality. For taped sessions, clip-on microphones produced sound quality far superior to that produced by directional microphones mounted on the cameras. Overall sound quality of the tape was also improved by using sound recorded in the studio for the narration needed to accompany scenes taped elsewhere.

Participant Assessment

Evaluation Instrument. Immediately following the one-way video, two-way audio teleconference, the 93 persons participating were asked to answer ten brief assessment questions, developed in cooperation with the Curriculum Development Department of Augusta Tech. Respondents were invited to add written comments to the evaluation sheet. The anonymous responses of participants were used as one measure of the effectiveness of the conference.

Analysis of the evaluation consisted of computing the frequency of each response and the percentage of each response when compared to the total number of persons responding to that question. Cross-tabulation and chi-square analysis were used to compare the responses of persons who had attended a video teleconference before with those who had not.

Overall reaction. Overall, the response of the audience to this trial staff development videoconference was very positive. When asked, on the evaluation instrument, "Would you recommend video teleconferencing as a suitable alternative instruction delivery method?", the responses

were overwhelmingly positive. Eighty-three of ninety-two responding to the question, or 90.2 percent, answered "yes;" only nine, or 9.8 percent, responded negatively.

The table below presents the other questions asked, the responses given, and the numerical analysis of those responses.

TABLE I
EVALUATION OF PILOT STUDY SATELLITE TELECONFERENCE

Question	Response Choices		Number Responding	Percent Responding
1. Have you attended a video teleconference before?	1.	No	64	70.3%
	2.	Yes	27	29.7
2. TO WHAT EXTENT:				
A. Was the length of this program appropriate for the material presented?	1.	Too Long	1	1.1
	2.	Too Short	17	18.5
	3.	About Right	74	80.4
B. Was the time alloted for interaction appropriate?	1.	Too Long	0	--
	2.	Too Short	40	43.5
	3.	About Right	52	56.5
C. Was the process for interaction appropriate?	1.	Poor	7	7.7
	2.	Good	66	72.5
	3.	Great	18	19.8
D. Were the handouts helpful?	1.	Not helpful	2	2.2
	2.	Helpful	35	37.6
	3.	Very helpful	56	60.2
E. Did the program meet your expectations?	1.	Not at all	1	1.1
	2.	Somewhat	54	58.1
	3.	Greatly	38	40.9
F. Do you think (feel) this conference would have been more or less effective than a conventional face-to-face meeting?	1.	Less Effective	23	25.6
	2.	About Equal	67	74.4
	3.	More Effective	0	--
3. Would you recommend teleconferencing as a suitable alternative delivery method for:				
A. Staff Development	1.	No	9	9.2%
	2.	Yes	83	90.2
B. College Courses	1.	No	23	25.6
	2.	Yes	67	74.4
C. State Meetings	1.	No	39	42.9
	2.	Yes	52	57.1

Assessment Analysis

Length. A large number, 80.4 percent, of this audience felt that the teleconference was about the right length. Seventeen of the 92 persons who responded would have preferred for the conference to be longer. These responses indicated that the two-hour videoconference was a successful length, and that a slightly longer conference could be considered in the future.

Time for Interaction. The group slightly favored the response that indicated that enough time was allotted for interaction with the speaker, but almost half of the respondents (43.5%) would have liked more time. All of the questions submitted for consideration by the speakers could not be answered in the time allotted. The unanswered questions were submitted immediately to the speakers in Athens using the UGA College of Education electronic bulletin board, and answers were sent back using the same electronic medium. Based upon that unforeseen circumstance, more time was needed for interaction with the speakers.

Process for Interaction. The majority of the participants, 72.5 percent, found the process of submitting written questions a good one for interaction with the speaker, and 19.8 percent thought that the process was great. These responses affirmed that the audioconferencing process was appropriate for interaction following one-way video presentations.

Handouts. Ninety-one of the 93 respondents found the handouts to be helpful or very helpful. These handout materials were designed specifically to support the videoconference delivery of information, and the class confirmed that the materials achieved that objective for all but two persons present.

Meeting Expectations. The program met the expectations of 58.1 percent of the respondents somewhat and greatly met the expectations of

more than a third, 40.9 percent, of those there. This question was general, but the very positive response of 40.9 percent of those attending encourages the use of this method in the future.

Comparison With Conventional Instruction. No respondent felt that this conference was more effective than conventional face-to-face instruction. However, 67 persons, or 74.4 percent, selected the "about equally effective" response, indicating that this group found the videoconference as effective for this purpose as the traditional classroom approach. This finding confirms other research findings on this topic.

Interestingly, this audience overwhelmingly recommended video teleconferencing as a suitable delivery method for staff development courses (83%), but showed less enthusiasm for its use for college courses (67% favoring), or for state meetings (52% favoring). Three persons expressed the view that the videoconference should not replace state meetings, since those meetings are a time for valuable interaction with other persons who attend. One person recommended the videoconference for 60 percent of state meetings, stating that there is a need to look at educational equipment in person.

Several persons indicated that videoconferencing could be effective for part of the state meetings, or part of the instructional material of college courses.

Chi-square analysis. Participants were asked whether they had attended a videoconference before, in order to compare the evaluation instrument responses of those who had attended before with those who had not. A cross-tabulation and chi-analysis was performed on each item. The result was that at the .05 level of confidence there was no

significant difference between the responses of the two groups to any question.

The greatest difference in responses occurred in answer to the question, "Do you think (feel) this conference would have been more or less effective than a conventional face-to-face meeting?" The comparison of answers to this question is shown below:

Response Choices
(Videoconference Compared with Traditional Instruction)

Participants:	Less Effective	Equally Effective	More Effective
With experience	3	14	9
without experience	15	40	9

The difference between the two groups was significant at the .06 level of confidence, but not at the previously set .05 level of confidence, and indicate, although the total numbers are small, that persons with video conference experience in the past were more likely to believe that videoconferencing and face-to-face meetings are equally effective.

A table showing the item-by-item chi-square analysis is included as part of Appendix C.

Other comments. Of the 22 comments that were offered, most presented suggestions for improving this initial effort. These included the following: More visual aids; visual projection of the subject discussed, item by item; lab scenes more pertinent to subject; exit at rear of classroom would be less distracting; too much static; lecture material covered too quickly and was boring; more handouts; closer following of handouts; more immediate interaction; furnish handouts prior to presentation for preparation; more time for interaction. A complete listing of comments is provided in Appendix C.

Discussion of Pilot Study Videoconference

This study presents positive support for one-way video, two-way audio teleconferencing as an acceptable alternative for traditional educational programs, and especially as a supplement to traditional delivery. In this pilot use of the medium for staff development, the large audience of 93 persons overwhelmingly favored videoconferencing for this purpose.

Contrary to popular belief, video teleconferencing can be cost-effective when compared to traditional approaches to providing staff development instruction. This pilot study was a cost-effective use of faculty time and of other resources. Initial outlay in some instances is high, but must be balanced against the cost-savings of direct travel costs and the costs of productivity time that is lost when the faculty members or class participants are driving to and from a conference.

The design of this videoconference showed that satellite conference time, the length of actual live transmission, does not have to be extremely long for the total seminar to be effective. In this study, the audience responded very well to a two-hour broadcast as part of a three-day workshop on the topic. Content delivery was intensive within the two hours of broadcast time, but detailed handouts were satisfactory in giving the class participants the extra explanatory information they needed.

Participants appreciated the opportunity to interact with the lecturers using the audioconferencing and electronic bulletin board modes, and would have liked even more interaction. This study shows that the physical presence of the lecturer is not necessary for a topic such as this, but that opportunities to ask questions are necessary and

appropriate. Immediate, personal interaction would be missing without the audio or computer conferencing component.

Preparing the class in advance for the broadcast event with materials and an agenda would have been a valuable way to enhance the time spent in the videoconference session. Preparation before the broadcast could be used to develop readiness for the program, to establish a base of knowledge within the group, and to develop identification between the presenters and those attending the session. The presenters need detailed background information on the class participants as well.

Although this study showed that postsecondary vocational education faculty are enthusiastic about the use of video teleconferencing for staff development topics, this group was not as certain about its use for college courses or state meetings. One disadvantage that was expressed strongly in regard to state meetings was the lack of opportunities to interact with other members of the group and with other persons from across the state.

Satellite Conference Conclusions

This study shows that one-way video, two-way audio teleconferencing can be substituted for faculty travel as a successful method to provide staff development. Persons participating in this study found this method to be as effective as traditional classroom instruction.

Contrary to popular belief, this type of teleconferencing can be cost-effective, for the initial videoconference, and in creating videotapes that can be used repeatedly in conjunction with audioconferencing or electronic message boards for subsequent inexpensive programs. The initial investment is spread over the large numbers of people who are successfully reached by one training effort.

Because advance planning for a video broadcast is technically complex, initiation of professors and coordinators into the medium requires budgeting time for the preparation of first efforts. On-site facilitation and administrative support are also essential. Clearly, videoconferencing calls for a team approach.

We recommend that video conferencing programs be further implemented into the State Postsecondary Improvement Program as feasible and beneficial to convey not only staff development, but for any message or instruction that is three-dimensional in character. The result will be consistent and expert knowledge accessible to every location in Georgia.

Satellite Teleconferences Recommendations

The following recommendations are based on the experiences of the staff in preparing for and delivering the satellite teleconference, the inputs from the participants, and the insights gained from reading the literature:

1. Select a Topic of Interest

The higher the participants' interest in a particular topic, the better the participant will receive the program. Ideally, the participants should help identify the type(s) to be presented. Operationally, however, the administrator has the prerogative to structure efforts to improve instruction. When this occurs, there will always be those who feel they do not need to improve and resent going through an educational program.

2. Structure For and Include Time for Interaction

Two-way audio is a relatively inexpensive way to have timely participant reactions or questions. Including time for live interaction during a satellite broadcast is very expensive but necessary. The

questions not covered during the live broadcast could be handled by two-way audio or by the electronic bulletin board.

3. Secure Background Information

It is imperative that the program presenters have inputs from the Administrator on the group to receive the educational programming. Program objectives would be incomplete or impossible to identify without these time consuming efforts.

4. Be Prepared for Some Negative Reactions

It is impossible to please all of the people all of the time. Many are convinced they do not need to improve, resent taking the time to participate, and feel the subject to improve is beneath them. A well-informed administrator will realize these perceptions and better understand some of the negative comments.

5. Select Effective Presenters

The availability of more advanced technological equipment at a more favorable price is ahead of the availability and supply of educators who are familiar with distance learning. Many educators are professionally competent in the knowledge of their respective disciplines, but the same persons are not necessarily familiar with the equipment or methodology of delivering distance learning. The master professor may not be prepared to deliver a program via the video satellite, electronic bulletin board, or audio teleconferencing. The knowledgeable professor will need assistance in order to be effective in teaching through distance learning. The sponsoring agency will need to build in support services to facilitate the delivery of an effective educational program. The selection of presenters will need to include the consideration of effective teaching techniques and familiarity with distance learning technologies as well as technical knowledge expertise.

6. Carefully Prepare Handouts or Written Documents

Most effective communicators and educators are organized and prepare supporting documents to accompany their lectures. The same degree of care and preparation is inadequate for distance learning. In a regular classroom, the professor has the privilege of immediate interaction to help clarify misunderstandings. In a satellite broadcast, the time for normal clarification is very expensive. In order to maximize learning for the participants, handouts must be sequential with the presentation and of greater detail for the participants to use following the presentation. This procedure will enable the live broadcast to be more intensive and therefore more cost effective. The contract for services must consider the need for professionally prepared supporting documents or handouts.

7. Include Costs for Planning, Preparation, and Practice

Any successful distance learning program has many hours of activities that precede one hour of actual presentation. Some experts have projected the time to plan, prepare, and practice will take thirty to fifty hours for each hour of actual program. This is especially true for the first programs. As everyone gains experience over several programs, this lead time should decrease. If it would normally cost $6,000 per course for a professor to teach a regular class, then the cost for a satellite presentation must consider the additional time and supporting activities.

8. Select Receiving Sites Close to Participants' Residences

Institutions are increasingly considering the time it takes for their employees to actually drive or fly to workshops or meetings. If it takes one day to travel to a meeting and another day to return home, then these days are lost productivity. Distance learning should enable an

employee to receive the instruction plus have two additional days for personal or institutional priorities. In considering a large number of faculty members or administrators, the cost/benefit ratios and cost/effectiveness ratios are more favorable to distance learning. Most employees prefer to have the comforts of staying home and participating in a satellite teleconference versus having to be away from their families to participate in a meeting held centrally.

9. Do a Pilot Study

Any institution seriously considering the alternatives to traditional meetings, conferences, or classroom teaching would be well advised to pay for a pilot study. Most major universities have the professional personnel to plan, conduct, and write up an accurate evaluation and report. The funding institution would also have the benefit of receiving inputs from their own employees. The major universities should be able to conduct the pilot study for a more reasonable cost than a commercial firm. The universities must recover costs but this is usually inexpensive compared to industrial charges. The pilot study should include a section that identifies recommended steps or procedures for subsequent programs.

10. Select a Public Institution with the Proper Equipment

This recommendation is one to help conserve scarce resources secured from tax dollars. Unless an institution is planning on conducting many distance learning programs, it would be more cost effective to contract with a major university with the up-link equipment, computer(s), and professional personnel. Commercial institutions also have the equipment and personnel but will not be able to compete on an equal cost basis with a service-minded public institution. The cost for up-link sites vary from $100,000 to $1,000,000. An institution could conduct many hours of

distance learning programming for the initial purchase price. The purchase price does not include the cost for permanent engineers and technicians in the production room. Three full time engineers and technicians would exceed $100,000 per year in regular re-occurring expenses.

11. Match the Educational Objectives with the Appropriate Distance Learning Technologies

It is apparent that many institutions are turning to distance learning as an alternative to traditional delivery methods. Satellite video teleconferencing should be considered as a viable alternative to traditional ad hoc meetings or classrooms. The satellite video teleconference is not recommended as a wholesale replacement for traditional classroom instruction. This technology may be employed to reach a variety of sites with marginal enrollments in advanced class membership. The economics of offering upper division courses to very small classes over a number of institutions can free up many professors at the receiving sites for more cost effective utilization of talented and expensive faculty members.

OBSERVATIONS ON CREATING AN OPTIMAL CLIMATE FOR THE USE OF TELECONFERENCING

The incorporation of the use of teleconferencing into postsecondary vocational education, whether in the form of audio, computer, or video conferencing, will improve communication and access to instruction across the state.

As the initiating body, the Postsecondary Board has the option of beginning slowly and cautiously, or of embracing the new technology quickly for its rapid, needed effects. The former option is a safe, gradual course that requires a degree of coordinated effort; the latter is a bold, challenging course that calls for concentrated effort, an initial outlay of resources, and central leadership.

A quick launch of teleconferencing can be effective when there is a proven need for its use and advance commitment is obtained from receiving sites. In just two years, the Alberta Hospital Association designed, created, and operationalized an audio conferencing network for staff development that involved 20 hospitals, was accepted by users, and produced 350 programs. The first step was monetary commitment by the hospitals, who designated training budget funds for the project and by doing so, became network members. The next step was an intensive promotional campaign that included demonstrations at the various sites. This step was essential to gain user acceptance. Local facilitators were then designated. Some educational programs were created, but others were obtained from existing networks. The results have been very positive, and the program is financially sound. The quick launch, well-planned and supported, catapulted the innovative technology into success (9).

In an optimal teleconferencing environment planners recognize that electronic communication is different from, and need not imitate,

face-to-face instruction. Across the country and in Canada, institutions are learning to work with electronic media as unique instructional and communication forms that demand rethinking the organization of lectures and presentation styles. (For example, a lecturer who does not face an audience must be a communicator who can check verbally for understanding, a person skilled in communication.) And the net result of learning to work with the new media, using better communicators and better organization of materials, is better programs than were available before.

Interactive communication between lecturer and class participant is the key element in any teleconferencing approach. It was the possibility of interactivity that made videoconferencing and computer conferencing appealing for the distance delivery of education. For postsecondary vocational education students, interactivity means building into the teleconference what John Naisbett in Megatrends referred to as the "high touch" component necessary if one is to embrace a new technology. Effective vocational course designers will find the "high touch" components that will involve their students. Videoconferencing, for example, offers high-touch possibilities in demonstrations that can be duplicated by students in the classroom miles away; audio conferencing must present opportunities for each student to be heard; the computer conference high touch component may be in providing the individual student choices of answers that lead to different program pathways. Combinations of delivery systems could be very effective in this regard.

Surveys have shown that whenever teleconferencing in any form is introduced into an organization, the electronic media begins to actually create its own optimal climate. When an innovative person brings a teleconference use into a location, new applications and wider uses are soon found. The pilot computer conference in progress this quarter at

the University of Georgia is a case in point. Once the postsecondary vocational education teachers had experienced the computer conference, several of them envisioned other conferencing applications and other computer uses for their classrooms. Five purchased their own computers. A receptive climate for continued computer conferencing is in the making at those locations.

It has been written that "To compete in a technological world we need to develop a computer-literate, technology-competent workforce" (5). The endorsement and wide use of teleconferencing within the postsecondary vocational education system of Georgia will move our state toward that goal.

REFERENCE LIST, ANNOTATED

[Note: The brief annotation is included to relate the content of each reference to the purposes of this report.]

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3. Kelleher, K. & Cross, T. B. (1985). Teleconferencing: Linking people together electronically. Englewood Cliffs, NJ: Prentice-Hall.

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4. Stockbridge, C., & Fischele, D. R. (1983). Quorun teleconferencing: A meeting of minds. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communicatins II (pp. 177-183). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Describes range of American Bell teleconferencing systems, including audio teleconferencing systems, audiographic or the electronic blackboard conferencing systaems, and Bell's video conferencing system.]

5. O'Grady, P. (1985). Hi tech/hi touch training at AT&T Communications. In L.A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications IV (pp. 76-81). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Details procedure of using PC terminals and headset audioconferencing to train 400 workers at scattered locations in the use of a new spreadsheet program in just 4 hours.]

6. Grieve, S. & Singer, N. M. (1984). Satellite telecommunications and their potential for vocational education. Columbus, OH: Ohio State University, National Center for Research in Vocational Education. (ERIC Document Reproduction Service No. ED 246 232).

[Findings of a study that examined vocational education satellite applications since the 1960's, showing that satellite systems require strong commitment among sponsors and participants and clear incentives for use; envisioned as a way to keep vocational education current.]

7. Pereyra, S. G. & Bisbano, P. R. (1985). Highlights: Connex user roundtable '84. In L. A. Parker & C. H. Ogren (Eds.), Teleconferencing and electronic communications IV (pp. 82-88). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Lists factors necessary to "sell" audio teleconferencing to a group, and lists human factor shtat affect teleconferencing success]

8. Hudson, L. R., Kinser, P. A. & Cragan, J. (1985). Interactive audio-telecommunications: A cooperative sommunity venture. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications IV (pp. 1-6). Madison: University of Wisconsin-Extension, Center for INteractive Programs.

[Outlines areas of cooperation among a fire department and two colleges in Central Florida in the use of audio conferencing; gives details on equipment purchased]

9. Porwse, A. J. & Monsma, E. G. (1985). The Alberta Hospital Association's teleconferencing network: A growaing success story. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications IV (pp. 7-14). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Analyzes how an effective, financially sound audio conferencing network of 20 hospitals was designed, put into operation, and accepted in two years; system has delivered 350 staff development programs; describes major elements of success in overcoming resistance and in learning to use the medium effectively]

10. Brownstein, M. (1984). Teleconferencing: The Continental Insurance Company. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications III (pp. 1-6). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Presents promotional campaign and support systems used to create acceptance for audio conference network that links 3 locations and 6000 employees successfully]

11. Healy, M. K. (1984). The use of teleconferencing for mental health staff development, continuing education, and clinical consultation purposes: A successful application. In L. A. Parker & C. H. Olgren (Eds), Teleconferencing and electronic communications III (pp. 18-28). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Describes successful audio conferencing program initiated in Pennsylvania and plans for its improvement and expansion. Improvements included handouts far enough in advance to allow for study prior to programa nd 10 minute breaks in two-hour programs]

12. Paul, J., Kleisath, S., & White, S. The use of teleconference networks as a delivery mode for long distance learners. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications IV

(pp. 68-75). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Tips for the audio lecturer, based on an audio linkage of every county in Wisconsin, 200 sites.]

13. Lopos, G. (1984). A prescription for serving rural communities by audioconferencing. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications III (pp. 48-53). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Compares four-wire (dedicated link) and two-wire (dial-up) audio conferencing systems on basis of sound quality]

14. Johnston, C. & Eley, L. M. (1985). Educating your educators: Raising confidence levels and improving delivery styles of your faculty through a "teaching techniques" audio teleconference. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications IV (pp. 52-55). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Training for 20 teachers on technicalities of system and on re-thinking standard materials and delivery styles to better fit the audio format.]

15. Benning, M. (1985). Considerations in the instructional use of audio conferencing: A faculty perspective. In L. A. Parker & C. H. Olgren (Eds), Teleconferencing and electronic communications IV (pp. 37-41). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Lists results of Learn Alaska faculty survey; faculty examined barriers to successful programming, benefits of distance delivery, and professional development needs of audio lecturers.]

16. Boone, M. E. & Bassett, R. E. (1983). Training people to audio conference: A review of the current wisdom. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications II (pp. 333-340). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Names skills needed by audio conference instructors and participants]

17. Muse, C. & Baine, M. (1985). Audio teleconferencing: The Georgia experience. Fourth Annual Conference Applying New Technology in Higher Education, 18, 267-273.

[Identifies five potential uses for audio conferencing: administrative communication, staff development, teaching specific groups, coordination of meetings or joint project review, informal use. Projects conference call cost at 25 cents/minute/line in-state.]

18. Parker, L. A. & Olgren, C. H., Eds (1984). Teleconferencing and electronic communications III. [Introduction] Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Discusses the growing pehnomenon of computer conferencing and survey results that show that once introduced into an organization by an innovator, computer conference applications expand in that organization.]

19. Dobos, J., & Grieve, S. (1985). Synchronous computer conferencing: Protocols and procedures for productive use of time. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications IV (pp. 370-380). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Compares asynchronous and synchronous computer conferencing modes, based upon a small group study.]

20. Singletary, S. A. (1984). 1984 Definitive buyer's guide to teleconferencing products and services. Telespan.

[As stated in title.]

21. Foell, N. A. (1984). Microcomputers and vocational industrial education: The industrial cooperative education teacher's perceptions. Journal of Industrial Teacher Education, 22, (1), 6-13.

[Results of a study to determine the needs for microcomputers that vocational industrial education teachers perceive for themselves in the classroom and for their students in their future jobs.]

22. Foell, N. A. (in preparation). Distance learning and teacher education: Is it realistic?

[Journal article being written to describe results of computer conference pilot study conducted Spring, 1987, at the University of Georgia.]

23. Foell, N. A. research observations, May, 1987.

24. Johnston, W. (1985). Teaching foreign language via satellite. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications IV (pp. 146-155). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Includes useful comments on satellite conference costs, stating that cost-effectiveness requires large numbers of students, and the first ten minutes cost the most, so it is more economical to lease a satellite channel for a block of several hours.]

25. Kelleher, K. & Cross, T. B. (1985). Teleconferencing: Linking people together electronically. (tables, pp. 121-123). Englewood Cliffs, NJ: Prentice-Hall.

[Tables compare audio, video, and computer conferencing

characteristics.]

26. Russell, J. R. (1985). Extending the capability of IHETS: An interactive videoconference course taught over the Indiana higher education telecommunications system. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications IV (pp. 178-185). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Asks for research into understanding television as a communication medium and conditioning force on those who watch.]

27. Flournoy, D. M. (1985). Distance teaching: Telecommunications in education and training. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications IV (pp. 174-177). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Assesses results of pilot full-motion videoconference linking campuses of Ohio University.]

28. Blatecky, A. R. (1985). An overview of a multi-point video conferencing system. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications IV (pp. 156-164). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Detailed description of structure and operations of video system that links 11 colleges and research facilities in central North Carolina, using microwave towers constructed for the highway patrol.]

29. Liguori, C. (1985). A video teleconferencing success story. In L. A. Parker & C. H. Olgren (Eds.), Teleconferencing and electronic communications IV (pp. 186-189). Madison: University of Wisconsin-Extension, Center for Interactive Programs.

[Outlines switch of commercial bnaking firm from audio to video conferencing, citing needs to transmit graphics immediately and to identify with persons at other locations as the reasons.]

30. Teleguide: A handbook for video-teleconference planners, Public Service Satellite Consortium, Washington, DC, 1981.

[One of the early guides, still useful for planners.]

31. McNelly, D.E. (1987, March). Higher educational institutions and distance learning. Paper presented to off-campus advisory council, University of Tennessee (Knoxville).

APPENDIX A:

SURVEY OF OTHER STATES

1. Cover letter and questionnaire..... 73
2. Mailout listing..... 76
3. Responding States..... 80

THE UNIVERSITY OF GEORGIA
COLLEGE OF EDUCATION
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ATHENS, GEORGIA 30602

AGRICULTURE EDUCATION
BUSINESS AND OFFICE EDUCATION
DISTRIBUTIVE EDUCATION
HEALTH OCCUPATIONS EDUCATION
HOME ECONOMICS EDUCATION
INDUSTRIAL ARTS EDUCATION
TRADE AND INDUSTRIAL EDUCATION

March 3, 1987

Dear State Liaison Representative:

We are conducting a national survey to ascertain some information pertaining to distance learning. The NNCCVTE State Liaison Representatives list was provided and recommended as the one best source for securing the data. For the purpose of the survey, distance learning includes teleconferencing, interactive video, audio and laser disk, computer conferences, electronic bulletin boards and VCR used in remote sites. The data will be reported in a collective form. No individual, state or institution will be reported, except to identify the exemplary programs.

Please take a few minutes today to respond to the brief questionnaire and return the completed questionnaire in the enclosed self-addressed envelope. A quick response would certainly be appreciated.

A copy of the survey report will be available, if you make your request known.

Sincerely,

C. Paul Scott
Acting Chairperson
Division of Vocational Education

Don E. McNelly
Coordinator
Technology Project

AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER

Educational Technology
Distance Learning

1. Are you involved in the delivery and/or development of distance learning programs?

   Yes No

   If no please forward to someone at your institution that is involved.

   If yes please complete the remainder of this brief questionnaire.

In your opinion:

2. What are the most important factors for a successful distance learning program?
   1. _____
   2. _____
   3. _____
   4. _____
   5. _____

3. What are the most frequent reasons for an ineffective distance learning program?
   1. _____
   2. _____
   3. _____
   4. _____
   5. _____

4. What are the 3 most frequently used distance learning technologies?
   1. _____
   2. _____
   3. _____

5. In your opinion, please list the type of institution effectively using distance learning and why are they effective?
   1. _____
   2. _____
   3. _____
   4. _____
   5. _____

6. What educational institutions in your state are effectively using distance learning?

	Institution	Contact Person	Phone Number
1.			
2.			
3.			

7. What exemplary programs are in process in your state?

	Institution	Contact Person	Phone Number
1.			
2.			
3.			

8. What type of educational programs should be used in distance learning?

1. _____
2. _____
3. _____
4. _____
5. _____

9. What advice would you give an educational institution considering using distance learning to serve a large state? _____

_____

_____

10. What research should be conducted pertaining to distance learning?

_____

_____

_____

11. How many hours in planning and preparation should preceed one hour of live video presentation? _____

12. When should an institution buy uplink satellite time

a). From a broker? _____

_____

b). From the owner of the satellite? _____

_____

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Eastern Caroline Islands 96940

Responding States and Territories

1. Alabama
2. Arizona
3. Arkansas
4. California
5. Colorado
6. Delaware
7. Washington, D.C.
8. Georgia
9. Hawaii
10. Indiana
12. Illinois
13. Kansas
14. Koror, Republic of Palau
15. Mayland
16. Michigan
17. Montana
18. New Hampshire
19. Nevada
20. Oregon
21. Rhode Island
22. South Carolina
23. South Dakota
24. Tennessee
25. Virginia
26. West Virginia

APPENDIX B:

SATELLITE TELECONFERENCING SUPPORT DATA

1. Participant Evaluation Instrument with Chi-Square Analysis Comparing Those Who Had Attended Previous Video Teleconferences With Those Who Had Not..... 82

2. Listing of Individual Participant Comments on Evaluation Instruments..... 83

3. Equipment Cost Estimates..... 87

QUESTIONS	RESPONSES	TOTAL NUMBER RESPONDING
1. Have you attended a video teleconference before?	1. No	64
	2. Yes	27

2. TO WHAT EXTENT:		Experience	No Experience
A. Was the length of this program appropriate for the material presented? $X^2 = 2.997$	1. Too Long	1	0
	2. Too Short	6	12
	3. About Right	20	33
B. Was the time alloted for interaction appropriate? $X^2 = .078$	1. Too Long	0	0
	2. Too Short	12	26
	3. About Right	15	37
C. Was the process for interaction appropriate? $X^2 = 2.888$	1. Poor	4	3
	2. Good	17	47
	3. Great	6	12
D. Were the handouts helpful? $X^2 = .406$	1. Not Helpful	1	1
	2. Helpful	10	24
	3. Very Helpful	16	39
E. Did the program meet your expectations? $X^2 = 2.62$	1. Not At All	1	0
	2. Somewhat	14	38
	3. Greatly	12	26
F. Do you think (feel) this conference would have been more or less effective than a conventional face-to-face meeting? $X^2 = 5.445$	1. Less Effective	3	15
	2. About Equally Effective	14	40
	3. More Effective	9	9

3. Would you recommend teleconferencing as a suitable alternative delivery method for:			
A. Staff Development $X^2 = .105$	1. No	2	6
	2. Yes	25	57
B. College Courses $X^2 = .018$	1. No	7	15
	2. Yes	20	46
C. State Meetings $X^2 = 1.289$	1. No	9	29
	2. Yes	18	33

INDIVIDUAL WRITTEN COMMENTS EVALUATING THE PILOT SATELLITE VIDEOCONFERENCE*

The comments are as follows:

1. More visual aids.
2. At state meetings, one of the most valuable things that happens is sharing with people - not just a two direction conference as this was.
3. On question number three, "Would you recommend teleconferencing as a suitable alternative delivery method for:

   C, State meeting - the respondent circled yes and wrote in especially GVA.
4. A. Provide visual projection of subject being discussed item by item - not the person speaking.

   B. Lab scenes were uninformative - showed nothing that was pertinent to discussion (exception - making paper weignt).

   C. Presentation could be <u>equally</u> well done with audio only.

   D. To do it better review "Presentation of Technical Subjects" Toast Masters International.
5. On item 2E.

   To what extent did the program meet your expectations the rater circled somewhat and offered the following comment:

   > I put somewhat - this is nothing but review for most of us: and I really don't believe staff development should be review - thank you.
6. Arrangement of classroom needs improvement - Disruptive when questions are delivered by monitor. Suggest having exit at rear of classroom.
7. Part of state meetings would be effecitve.

*Refer to previous page for copy of the evaluation instrument.

8. Too much static - lecture material was covered too quickly and was boring. Liked the example of classroom situations. I could read the handouts for the most part and gather the same information as I did from listening.
9. Needs work but good for first effort. I look forward to more and the improvement that will result with pratice.
10. More handouts to correlate with steps presented. I got lost several times.
11. Some of the deleveries were not followed by the handouts.
12. I think the lack of immediate interaction hurt the presentation.
13. On item 2C

To what extent was the process for interaction appropriate? The Respondent wrote:

> Not furnished with enough material prior to the conference to prepare adequately.

On item 2F

To what extent do you think (feel) this conference would have been more or less effective than a conventional face-to-face meeting? The respondent selected less effective and wrote the following:

> Due to the brief time for interaction.

On item 3A

Would you recommend teleconferencing as a suitable alternative deli very method for staff development, the respondent concluded yes and wrote:

> If well developed.

On item 3B

Would you recommentd teleconferencing as a suitable alternative delevery method for College Courses the respondent circled yes and wrote the following comment:

> for part of the presentation of material.

On item 3C

Would you recommend teleconferencing as a suitable alternative delivery method for State Meetings the responden circled yes and wrote:

Good vehicle.

14. I had some diffeculty following _____ in the packet.

15. This was a waste of my time!

16. Let's do it again on another topic.

Item 2B

To what extent was time allocted for interaction appropriate? The respondent selected about right and stated:

Because of the electronic bulletin board.

Item 2C

To what extent was the process for interaction appropriate? The respondent selected great and wrote:

Good interaction with packet. Questions via telephone and video.

Item 2D

To what extent were the handouts helpful? The respondent selected very helpful and stated:

These were a must for me to follow this information.

Item 2E

To what extent did the program meet your expectations? The respondent selected greatly and wrote:

I like all the questions being answered.

17. I do not think it (teleconferencing) would be appropriate for state meetings due to interaction between instructiors needed. It is good for staff development and classes when an instructor gives out info. and students (Staff) can interact with the instructor. However, when the members of the class (group) need to interact - it will not be effective.

18. On item 3B.

Would you recommend teleconferencing as a suitable alternative delivery method for: College Courses? The respondent selected yes and wrote:

> 15 to 20% of courses in person.

On item 3C

Would you recommend teleconferencing as a suitable alternative delivery method for: State Meetings? The respondent selected yes and wrote:

> 40% of meetings stay conventional. Need to look at educational equipment in person.

19. I liked it.

20. More is geared through interaction after, tjam tjrpigj tje ;ectire. This does not lend itself to interaction within a group. This is especially true for state meetings.

21. Cover one topic per session. Not several options.

22. On item 2F

To what extent do you think (feel) this conference would have been more or less effective than a conventional face-to-face meeting? The respondent selected about equally effective and stated:

> Could be more effective as professors present information clearly, consisely and concretely. Flash form discussed on screen rather than just showing speaker.

Excellent presentation from everyone!

Thank you.

VIDEO CONFERENCE EQUIPMENT COSTS (Provided by Karl Williams, Augusta Tech)

DOWNLINK SITE HARDWARE

		Approximate Cost
1.	Telephone with inward dialing capability - extension run past PBX on separate line	
2.	Speaker Phone	$200-$300
3.	2 26"-30" TV receiver monitors	26" $1,000 each 30" $1,500-$2,000
4.	Heavy duty wall mount brackets	$100 each
5.	1 VCR for recording--depends on decision for 1/2" VHS or 3/4" recording	
6.	Minimum 10-foot solid fiberglass parabolic dish	$1,000-$1,200
7.	Dish electronics	
a.	"C" band low-noise block down converter with maximum noise temperature of 100o	$300
b.	"K" band low-noise block down converter (no specified maximum noise temperature, but the lower the noise figure, the better)	$400
c.	Dual polarized "K" & "C" band feed system hardware mount	$200
d.	Polarotor	$80
e.	Actuator/controller (suggest top of line tracker system brand). Must have lockout capability, capable of being computer-driven, and have a permanent memory backup	$800
f.	4 conductor 14-gauge cable	$0.63/foot
g.	Receiver--must be compatible with two LNBs described in 7a and b, compatible with tracker system computer-driven in 7e, and must have clamped and unclamped video capability	$850
h.	19" TV receiver/monitor for incoming signal	$500
i.	Miscellaneous connectors, taps, bridges, VCR cabling and connectors	$500
j.	Tower depends on system purchased--to be determined by site surveys, etc.--our mechanical engineering technology department specified our tower design.	

DISTRIBUTION CENTER TO CONNECT BUILDINGS/ROOMS FOR SATELLITE FEED

1.	Channel 3 and 4 amplifiers	$200 each

PORTABLE PRODUCTION SET-UP FOR 3/4" VIDEOTAPE

Salesman: Hayes

QUANTITY	DESCRIPTION	PRICE	AMOUNT
1	Sony DXC-3000 Color Camera--3 CCD Chip		4542.00
1	Sony A12x9BERm-88 12:1 Zoom w/2X Extender		2300.00
1	Sony VO-6800 Portable 3/4" video Recorder		3358.00
1	Sony Porta-brace C-6800 Case w/Heavy Duty Strap		155.00
4	Sony NP-1 Batteries	75.00	300.00
1	Sony BC-1WA Battery Charger		322.00
1	Sony CMA-8 AC Adapter		373.00
1	Sony CCQ-10AR Camera/VTR Cable-33'		145.00
2	Sony VO-5850 3/4" Editing Video Recorder	6647.00	13,294.00
1	Sony RM-440 Editing Controller		1610.00
2	Sony RCC-5F Cables	110.00	220.00
1	Sony VDC5 Dub Cable		55.00
2	Sony PVM01380 13" Color monitors	362.00	724.00
2	8 Pin Cables	17.00	34.00
2	Audio Cables	10.00	20.00
1	Sachtler Video 14 w/Head and Dolly		1305.00
1	Sony C-74 Shotgun Microphone		624.00
1	50' Mic Cable		75.00
1	Lowel 01-93 Light Kit		941.00
1	Lowel D2-96 Light Kit		1267.00
	Laird Character Generator	7000-7500	

Prices reflect Fall Quarter 1986 on quote for Augusta Tech

Proposed UHF TV Station Equipment List

20 mile radius

Augusta Area Technical School

Summer Quarter 1986

Radio Equipment

Tower, 300-500' omnidirectional self-supporting (no guy wires)	$25-30K
Transmission Line, copper tubed	$40-60K
Transmitter, 10KW minimum aural tubes included (tetrode)	$55-60K
Kystron PA Tube, visual	$10-15K

Studio Link

Microwave link system, 12W 3 audio channels (stereo) (3d channel for diff. language, etc., 24 hour operation)	$20K

Studio Equipment

Master Control

Playback equip., 2 5850's @ $5.5K, 1 2800 @ $4.5K	$15.5K
Switcher, with stereo audio follow	$5-6K
Audio mixer for override	$1.5K
Editor, RM 440	$1.2K
Time-base corrector w/frame synch @ $6K One for each playback	$12K
Monitors, 17" @ $300 off air previewing One for each playback	$600
Character Generator Station ID	$5-6K
Misc., equip. racks, cables, etc.	$5K

Film chain (Optional)		
16mm		$10-15K
35mm		$9-10K
	$48K-54K	
Multiplexor		$4K
Camera		$25K
Studio Facilities		
Light grid, 20 X 40', 2' sqs. building using elec. dept.		$2.5K
Lighting package, assorted 20 ea.		$25K
Camera, color CCD, @ $5-6K		$15-18K
Switcher, production		$12K
Master synch gen., RS170A Redundancy		$10K
Distribution, sub-cxr, pulse, video		$6K
Aduio mixing board, stereo		$8.5K
Audio Distribution		$4K
Monitors, B/S @ $100 3 for video sources-cameras, 2 for char. gen.		$500
Monitors, color @ $300		$600
Character Gen., optional, QuantaFont 08 Vidifont graphics, paint box can use another like in MCC $5-6K		$32K
Remote equip., DC or RF 2 recorders 1 TBC		$6K
Test Equipment		
Deviation/Freq., visual, aural		$4K
(other equipment on hand)		
TOTAL	$370-476K	

Film chain 48-54K
QuantaFont + 27K
75-81K saved

No studio link if antenna on property. 20K saved

Get on cable--130K-165K saved (still need studio link)

Consultant Required:

Mr. William C. King
Jules Cohen & Assoc.
Washington, DC

(202) 659-3707

Down Link Equipment List

The Continuing Education Center at the University of Georgia provided the specifications for equipment they put out on bid. The state put the bids out under requisition or Bid No. 518-2594642. The Equipment List is as follows:

1.	10½ foot, all aluminum perforated dish, with aluminum mount and frame. Gain to be rated at minimum of 40.5 =db at 3.95 GHZ or 41.0db at 4.2 GHZ. The side lobes to be rated at 21 db down for the certified 2 degrees spacing of satellites. Wind load of perforated dish to be at least 140mph.	1
2.	Receiver must be multifunctional, wireless remote control, that will include AFC, Block downconversion, automatic polarization, memory for storage of at least 54 satellites and corresponding channels. Receiver should have satellite and/or channel lock-out control, and audio seek for finding correct audio. Readout of Satellite, channel, and audio frequency being received should be LED, front panel mounted.	1
3.	Guy wire kit for maintaining correct position of feedhorn assembly in high winds.	1
4.	The antenna actuator and receiver should be in one unit.	1
5.	Gardiner 55-65 LNA or LNB, whichever is applicable to desired system.	1
6.	100 feet of UL approved cables, direct burial, at least 15 year warranty. Must consist of material of at least 90% copper braided shield, and solid, all copper (90%) center conductor.	1
7.	Surge protection/noise filter for the AC line power.	1
8.	Complete static protection for all cables between satellite dish and receiver shall be provided.	1
9.	8 foot ground rod, comprised of 4 AWG solid copper shall be provided for lightning protection of the dish.	1
10.	SCOTLOK silicon filled cable connectors shall be used for weather protection of exterior connections.	5

(Equip. List cont.)

11. Cover for all outside electronics shall be provided. 1

12. High tensile plastic tie wraps for all exposed cables. 5

13. Complete installation, alignment, programming of receiver for correct satellite positions, training of designated operator at site of installation of satellite dish to be provided. 1

    Order does not include cost to remove Terrestrial interference, but shall include cost for installing the equipment within 10 working days after receipt of notification from owner, on a standard mount to be provided by owner. The mount will be either roof, wall, or ground at owner's option.

Items

Speaker Phones 3 @ $300

TV Receiver Monitors

26"	1,000 ea.	1,000	Small Groups
30"	1,750 ea.	3,500	Large Groups
19"	for Incoming Signal	500	

VCR for Recording

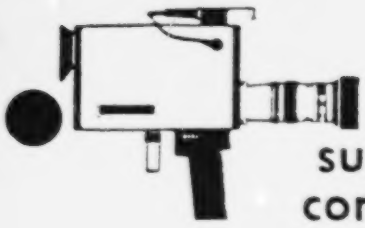
	1,000
	6,300
Plus	3,000
	$9,300 per Site

In order to conduct both small and large group conferences you would want 2 large TV Monitors for the Large Group and 1 smaller set for the Small Group. The estimated cost per down link site would be approximately $ 9,300.

AUDIOVISUAL INSTRUCTIONAL DELIVERY SYSTEMS

AT AUGUSTA TECH AS OF OCTOBER 1987

1. Satellite downlink video
2. Teleconferencing
3. Closed circuit playback of videotapes
4. 1/2" VHS videotape
5. 3/4" Videotape
6. Multiimage slides with audiotape
7. Single slides with audiotape
8. Audiotapes
9. 16mm films
10. Filmstrips



video supply sales company

QUOTATION

95

Date October 8, 1986

3440 Oakcliff Road Suite 112 • Atlanta, Georgia 30340 • (404)458-2468

COMPANY Augusta Area Technical School Attn: Mr. Karl Williams

ADDRESS 3116 Deans Bridge Rd.

CITY Augusta STATE Georgia ZIP 30906

Terms & Conditions Net 30 Days

Salesman	Ship Via	Date Required
Hayes		

QUANTITY	DESCRIPTION	PRICE	AMOUNT
1	Sony DXC-3000 Color Camera - 3 CCD Chip		4542.00
1	Sony A12x9BERM-88 12:1 Zoom w/2X Extender		2300.00
1	Sony VO-6800 Portable 3/4" Video Recorder		3358.00
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1	Sachtler Video 14 w/Head and Dolly		1305.00
1	Sony C-74 Shotgun Microphone		624.00
By		TOTAL	

Prices subject to change without notice

video supply sales company

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$30,7[illegible]

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QUANTITY	DESCRIPTION	PRICE	AMOUNT
1	50' Mic Cable		75.00
1	Lowel 01-93 Light Kit		941.00
1	Lowel D2-96 Light Kit		1267.00
	LAIRD [illegible]		$700.- $75.[illegible]
By		TOTAL	

Prices subject to change without notice

APPENDIX C:
GUIDE TO TERMINOLOGY AS USED IN THIS REPORT..... 98

GUIDE TO TERMINOLOGY AS USED IN THIS REPORT

Asynchronous. The characteristic of computer conferencing that allows conferencing participants to send or receive messages at their own convenience through the store-and-forward feature of the system. One person sends a message and one or more other persons read that message when they take the time to do so.

Audio conferencing (or audio teleconferencing). Two-way voice communication among people who are geographically separated, using telephone lines or microwave transmission, and who confer for a specified purpose or to meet a specific objective.

Bulletin board. The message storage-and-forward feature of some central computer systems through which persons with access codes can send/receive written messages, using their personal computer terminals. Access to the central computer is by telephone.

Computer conferencing (or computer teleconferencing). Interactive communication among people who send and receive messages using computer keyboards that are linked via telephone lines to a central computer system with a storage area, the conferencing area, dedicated to that purpose. The conferencing area is accessed with a code. Communication can be synchronized, with everyone scheduled to be at their keyboards at a set time, or asynchronous, in which case messages are stored in the central computer conference area until retrieved by recipients.

Dedicated phone lines. Leased telephone circuits arranged between two or more specific locations.

Dial-up phone lines. Telephone lines available through telephone companies, by dialing a telephone network.

Down link. The antenna (dish) and associated equipment used for receiving signals from a communications satellite; sometimes referred to as an "earth station," though earth stations can be equipped to receive only, or to send and receive signals.

Electronic blackboard. A system used to send written messages over an ordinary telephone line. The sender writes on a normal-appearing chalkboard, and the writing appears at another location on a television monitor.

Interactive comunication. Two-way exchange of communication.

Modem. A device, the modulator/demodulator, used to accept digital signals such as those coming from a computer terminal, and add them onto, or modulate them on, analog signals for transmission between sites via telephone lines.

Telecommunications. Communication between geographically separated locations using electronic media.

Teleconferencing. Use of an electronic medium for two-way communication by persons who discuss a specific topic, or interact to achieve a specific objective.

Up link. Equipment used to transmit signals to a communications satellite.

Video conferencing (or video teleconferencing). Two-way electronic voice and video communication between two or more groups, or three or more individuals in separate locations; may be fully interactive video and voice or one-way video and two-way audio.